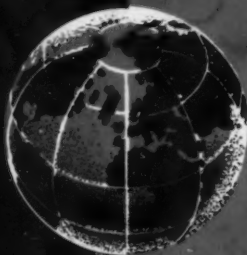


# MINING WORLD

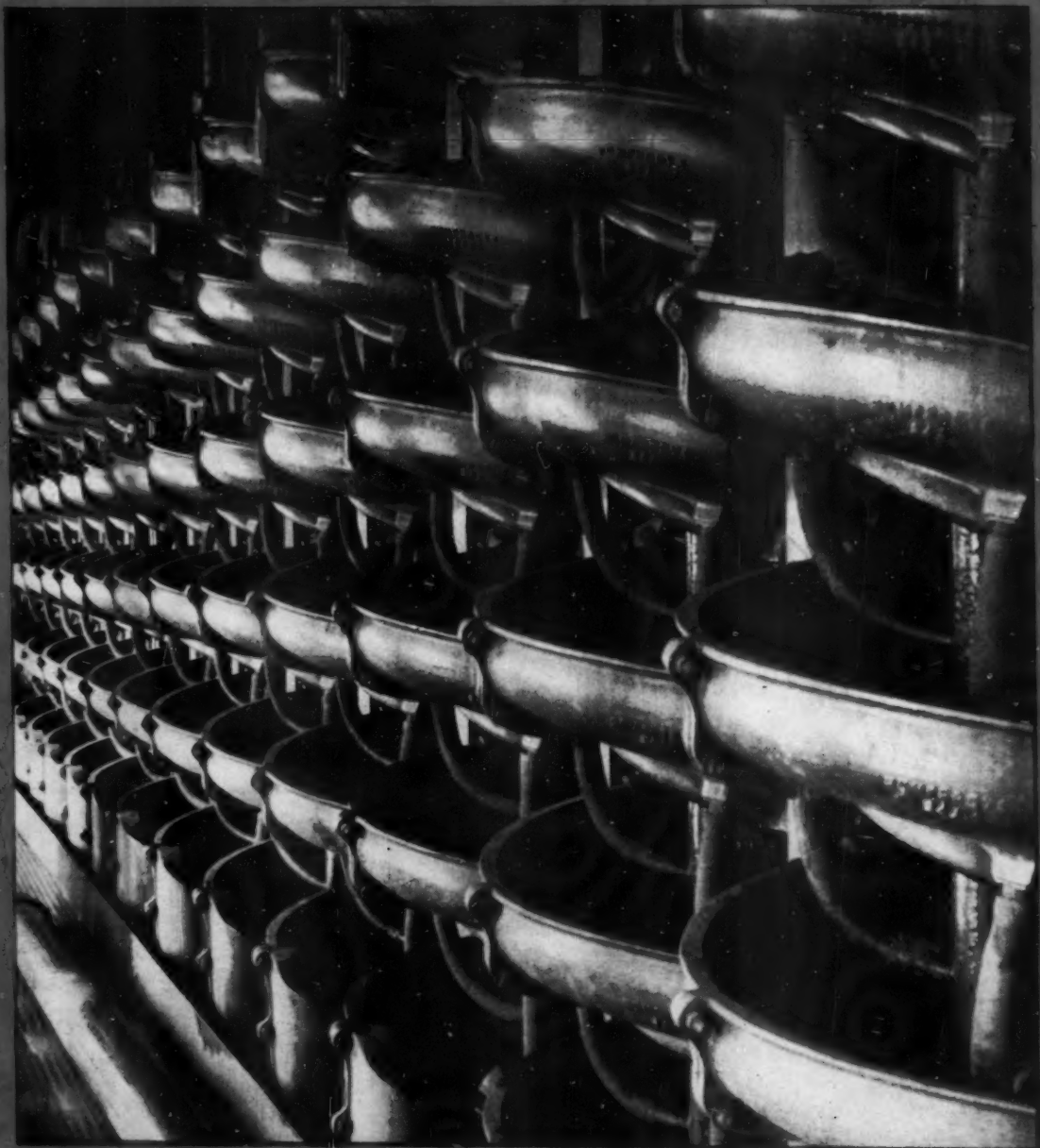


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Mine is Peralta Page 47

Why Electrolytic Copper Can  
Save Bagdad Money Page 50



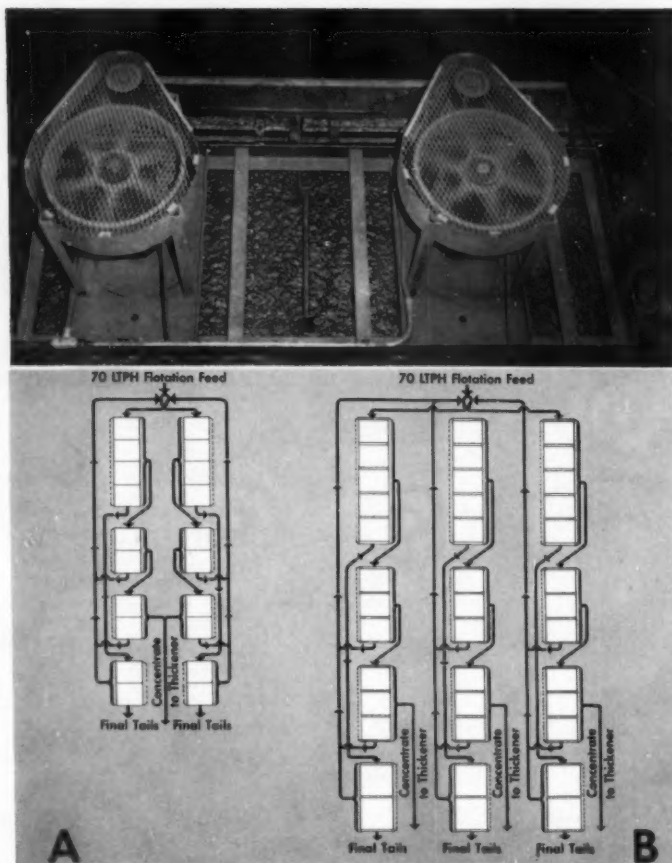
*How Hanna Beneficiates Mesabi Iron Ore*

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# WEMCO

## Fagergren Flotation 8 ways better!

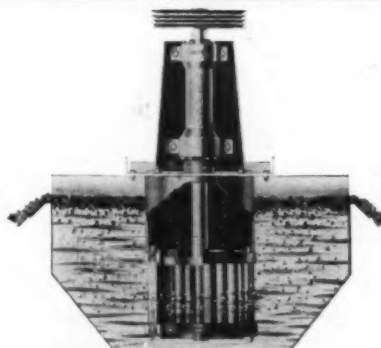
**here's the proof:** In an efficient new iron flotation concentrator, two parallel flotation circuits are used. Each receives identical feed, and each handles 70 long tons per hour with grade meeting market requirements. Check and compare these facts:



		Wemco Fagergren Units A	Other Flotation Units B
Circuit Characteristics	✓ Number of Cells	20	39
	✓ Gross Cell Volume <sup>1</sup>	1220 cu. ft.	2400 cu. ft.
	✓ Floor space (all cells)	644 sq. ft.	988 sq. ft.
	✓ Launder & Operating aisles (approx.)	167 sq. ft.	261 sq. ft.
	✓ Total Launder Length (approx.) <sup>2</sup>	225 ft.	375 ft.
Typical Metallurgical Results on This Type of Iron	✓ Units of Iron Recovered	1%-2% more	
	✓ Tailings Loss	1%-2% less	
	✓ Reagent Consumption	.2-.3 lbs. less per ton treated	

**Notes:** 1 - Taggart, Section 12 page 80, shows WEMCO-Fagergren efficiency of cell volume substantially greater than others, in addition to the above noted advantage in space alone.

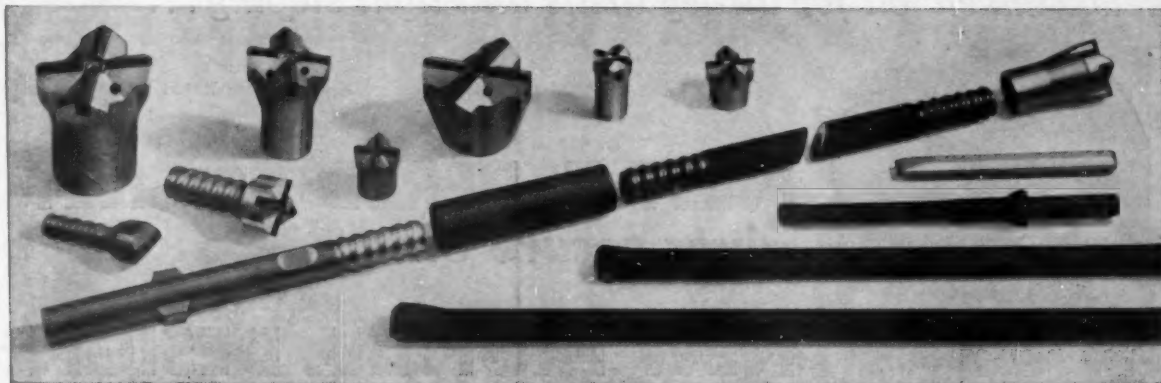
2 - Shorter launder length in WEMCO circuit allows steeper slope; requires less wash water, causing less dilution of concentrate and minimizing dewatering requirements.



A reprint of the complete story is available for the asking. Write to:

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Sandvik Coromant integral steels have up to 50% longer rod life than ordinary steels, thanks to anti-corrosion SR-treatment, which protects them during transport, storage and actual drilling. In addition, air-tight plastic caps give bit and shank extra protection during transport and storage. They are available in these standard sizes:—

$\frac{3}{4}$ " hollow hexagon	1'4"-13'1"
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1" hollow hexagon	2'6"-21'0"
Flexible drill steels	2'7"-31'6"

### Precision-made rock bits

The threads of Sandvik Coromant (cross and X-design) bits are precision milled. The bits are so accurately manufactured that not only smoother drilling but *longer life* are ensured. Standard bit diameter sizes range from  $1\frac{1}{2}$ " to  $4\frac{1}{2}$ ". The 773 bits (bottoming type) are available with GD400

and GD600 thread, or with  $1\frac{1}{2}$ ",  $1\frac{1}{2}$ " and 2" rope thread. The 776 bits, for standard shoulder-type drill rods, are available with threads ranging from  $\frac{3}{8}$ " to  $1\frac{1}{16}$ ".

### Efficient extension steels

The rope-threaded joints of Sandvik Coromant extension steels are solid and make joining and unscrewing extremely easy. Sizes available:  $\frac{3}{4}$ " and 1" hexagon steels,  $1\frac{1}{2}$ " and 2" round steels. A special feature of the  $1\frac{1}{2}$ " equipment is the  $1\frac{1}{16}$ " flushing hole, about twice as large as most. This gives better cleaning of the bore hole and a higher rate of advance, reduces wear and risk of steels sticking. The 'cold rolling' technique makes this wider flushing hole possible *without any loss of strength*.

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*New Timken® bit for air-leg drills and light stoping...*



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## **NEW FRONTAL DESIGN speeds chip removal**

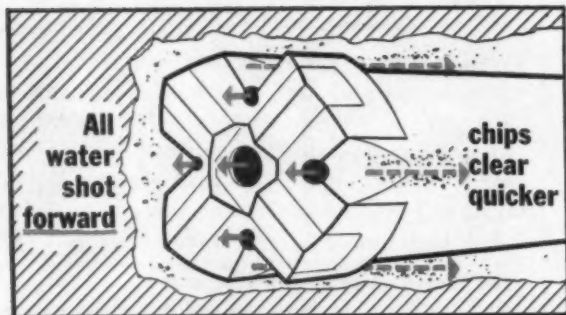
You can lower your cost per foot-of-hole with this new Timken® tapered socket bit. With its uniformly tapered socket, the new Timken bit gives a secure union for feed-leg drills. The precision-made taper fits tight to the drill steel, reduces breakage.

And the bit is removable, lets you make quick, easy bit changes. You drill out full steel life.

The new frontal design, with its specially positioned five front holes

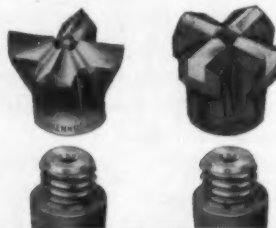
and deeper, wider wing clearance, speeds chip removal. Drilling goes faster, costs are cut even more.

Special analysis carbides give superior wear-resistance with added shock-resistance. And the new Timken tapered socket bit can be reconditioned many times to give you more feet-per-bit. Comes in 3 popular sizes: 1¼", 1½" and 1½". The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



**How New Frontal Design Speeds Chip Removal.** The new five front holes direct air or water with jet-action velocity against face—wash away chips faster. Deeper, wider clearance between cutting wings works in unison with five front holes to give speedier removal of Rock Cuttings. Tests show these new features speed drilling, lower your cost per foot-of-hole.

**THERE'S A TIMKEN BIT FOR EVERY JOB...  
EVERY DRILLING CONDITION**



**TIMKEN MULTI-USE BIT** (left) with correct, controlled reconditioning gives lowest cost per foot-of-hole when full increments of steel are used. **NEW TIMKEN THREADED CARBIDE BIT** (right) for other tough jobs. Improved thread contact reduces breakage. New wear-resistant carbides add life.

# **TIMKEN** REMOVABLE ROCK BITS

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# Mining World

Including the Export Edition WORLD MINING  
Published monthly except in April when publication is semi-monthly

VOLUME 19

AUGUST 1957

NO. 9

## OPERATIONS—TECHNOLOGY

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## ON THE COVER


A large portion of the iron ore concentrate from M. A. Hanna Company's new Hunner plant is obtained from the spiral section. Here 128 rougher spirals, and 64 cleaner spirals, process the slurry obtained from the primary classifier overflow from the washing plant.

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*Case in point* Tiger Brand Specialist Walter Wood (right) is shown here with C. E. Pauley, Manager of Mines, Spring Canyon Coal Co., Utah. They're inspecting the 1½ inch Tiger Brand haulageway rope that has already hauled more than 445,000 tons of coal during a 19-month period... and it's still in excellent condition.

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## Drifts and Crosscuts

### This Is No Time For Complacency

Everyone knows that the prices for copper, lead, and zinc have dropped to dangerously low figures during the last 60 days. Dangerously low for large and small mines alike. Even the large underground copper mines have had to curtail long planned development work in order to reduce costs. Underground zinc mines are in a much tougher spot because of the smaller spread between costs and price before the drop.

Don't think for a minute that the open-pit mines have been immune from the profit squeeze. A large zinc pit has already closed and several very large western copper pits are watching developments closely.

Everyone knows that large production, especially outside the United States, has built up excessive stocks of metals. Consumption hasn't kept pace with supply. Especially so when the largest buyer—the United States Government—reduced purchases both by bartering and General Services Administration's open market buying.

Everyone knows that something's got to give. Fortunately, simultaneous advances are being made on many fronts. Production has been cut, with United States companies taking the initiative. Sales promotion and new product research all designed to use more metal have been stepped up. The well-planned, long-range programs of the copper, lead, and zinc institutes and associations are leading the way. An even larger organization is being formed with major foreign producers taking a more important part to promote greater use of non-ferrous metals.

Legislative steps to overcome crisis are discussed elsewhere in this issue.

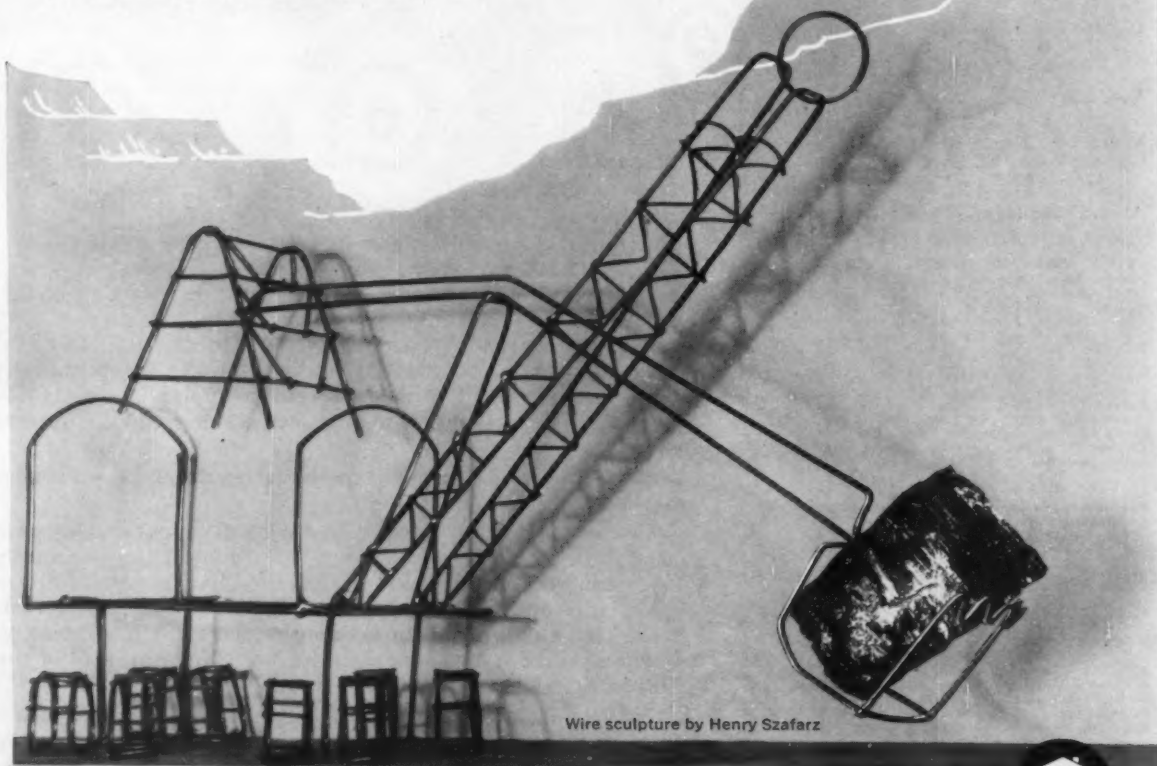
Everyone agrees to these basic steps—cut output and increase use. But the hardest step of all is to cut output for that means laying off men. A mighty tough job for any manager. Shutting down mines costs money, more money than is generally realized. That's why many marginal producers are continuing to operate. And must be kept open for the long-term good of the United States, company, labor, and the community.

Everyone can do his part. Labor must cooperate in cutting costs to keep mines operating. Some Unions are cooperating closely with management in doing everything possible to increase efficiency so as to keep operating. Unfortunately not everyone realizes the seriousness of the situation. This is no time for complacency.

Everyone knows that the long range demand for metals is up. Everyone must do his part now to keep mines going so as to take advantage of the future.

## Every Bite is a Payload

The effective use of power equipment is the very essence of successful mining operations. And everywhere that power is used in mines, you'll find Simplex-TIREX cords and cables on the job. These expertly engineered cords and cables, newly improved for greater flexibility, feature cured-in-lead Neoprene Armor that resists abrasion, oil, heat and water... gives longest life. **SIMPLEX WIRE & CABLE CO.**, 79 Sidney Street, Cambridge 39, Mass.



Wire sculpture by Henry Szafarz



Shovel Cable Type SH-D



Simplex  
**TIREX**

# MINING WORLD NEWSLETTER

... Boron ... Glen Cove ... Fernandia Beach

August 1957

Boron, MINING WORLD "Metal of the Year" in 1956, makes headlines again.

A high-energy fuel containing boron and hydrogen is now being produced by Olin Mathieson Chemical Corporation on a semi-commercial basis.

A \$1,000,000,000 industry is forecast from this development.

Increased demand for boron and its chemicals has meant a \$20,000,000 expansion program at U.S. Borax & Chemical Corporation's operations at Boron, California where an open pit has replaced underground mining.

The hunt for boron goes on. Southern California desert brines are being used by American Potash and Chemical Corporation and Stauffer Chemical Company to recover boron. The U.S. Geological Survey has been drilling in the Four Corners area of the Mojave Desert.

Metallurgical advancements herald low-cost metals.

A revolutionary tungsten process has been developed by Wah Chang Corporation for treatment of any type of tungsten ore in one continuous operation. Process also eliminates all objectionable wastes.

High-purity copper powder can be produced by a chemical process of leaching and gaseous reduction developed by the Chemetals Corporation, as licensee under American Cyanamid Company patents. Production of copper-base alloy strip from this powder has been evolved by E. W. Bliss Company engineers from German prototype designs to which Chemetals holds exclusive U.S. rights.

A new titanium recovery system is being installed by Union Carbide Ore Company at its Florida properties. A single dredge digs, separates, and pumps concentrates ashore, thereby eliminating floating auxiliary separation plants.

Titanium tetrachloride, needed for titanium manufacture, can now be produced at temperatures much lower than those required in the present method, yielding a higher purity product at less cost. Armour Research Foundation of Illinois Institute of Technology developed the new technique.

Help for lead and zinc producers still may come in this session of Congress through excise taxes recommended in the Long Range Minerals Program.

Congressional hearings are scheduled August 1 and 2.

Industry action may alleviate the problem, too. Prominent world-wide producers plan a stepped up research program to find new uses for lead and zinc. The Lead Industries Association has authorized Battelle Memorial Institute to evaluate and plan an expanded industry research program.

Look for continued interest in fluorspar.

Expansion of fluorspar production in Montana is underway. The state's first heavy media plant should be in operation before the snow flies.

Fluorspar is a growth industry, in the opinion of Bunker Hill Company's management, because it is related to the aluminum and steel industries.

An Idaho fluorspar deposit is being examined closely by Bunker Hill.

Merle E. Hanson has operated other graders, and he says:

**"THE NO. 12 HAS ALWAYS BEEN MY FAVORITE MACHINE"**



This Caterpillar No. 12 Motor Grader maintains two miles of 40-foot haul road at an open pit copper mine near Butte, Montana. On the job 8 to 16 hours per day, 6 days a week, this hard-working machine has the enthusiastic approval of its operator, Merle E. Hanson.

"The No. 12 has always been my favorite machine," he says. "I've operated other makes of graders and have had a chance to compare. The No. 12 has good visibility and is easy to handle. It has always taken less adjustment and less repairs than any other machine."

Other Caterpillar-built machines are also on this Anaconda Company operation. Four D8 Tractors and two D6 Tractors are removing overburden and copper ore. The F & S Contracting Co. of Butte, and the Morrison-Knudsen Co. of Boise, Idaho, have a joint contract from The Anaconda Company to do a limited amount of work on this ore body.

Already known as the "standard of the industry," the No. 12 has pulled even further ahead of the field

with its *exclusive* new Preco Automatic Blade Leveler, which makes it possible to control slopes within  $\frac{1}{8}$ " in 10' width. Other important features of the No. 12: powerful CAT® Diesel Engine; long radius, curved side shift rack that allows a full range of blade positions without changing links or adjusting the blade; tubeless tires — which reduce tire down time as much as 80%; and long-life oil clutch.

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**WANTED—  
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# Capitol Concentrates

## Mixed Reaction On Long Range Program As It Is Compared With Earlier Plans

The Administration's long-range program for lead and zinc has elicited loud hurrahs from those who consider it a break-through in the Administration's tariff policies. It will be recalled that the Simpson sliding scale tariff bill for lead and zinc was defeated in the House Ways and Means Committee by the concerted action of several Cabinet officers, and that the President would not accept the recommendations of the Tariff Commission under the escape clause.

The producers of other minerals are elated by the idea that once the "new" principle is implemented by the Congress the import-tax idea may be applied to their products. However, an examination of Tariff Commission recommendations to the President to raise tariffs indicates that few have been approved, that no general principle can be applied to the refusals, and that it cannot be assumed that if he acted in one way in one case he consistently would do the same thing in another.

The Seaton proposal to repeal the tariffs on lead and zinc, small as they are, might set a very dangerous precedent. No one can be sure that international agreement to apply import taxes to lead and zinc will be obtained and the industry might well find itself with no protection. At any rate, the Canadians already have threatened reprisals and it is said the Australians have filed formal objections with the State Department and will take the matter up with GATT if the import tax idea gets through the legislative stage. Peru and Mexico also are protesting. The same objections would apply to the Metcalf bill (H.R. 7844) which instead of variable import taxes would authorize a straight six-cent import tax when prices fall below the respective peril points.

Some observers comment that variation of the old premium price plan may be the proper solution, even though Interior Secretary Seaton and former Assistant Secretary Wormser have suggested it would lead to government controls. Five years' previous operation of the plan gave no such indication and it was the salvation of the small operator. However, in any such plan, arrangements should be made (as in a bill introduced by Senator James E. Murray some years ago) to place the metal on the open market to avoid stockpile quota limitations. This would definitely improve the position of the consumer without damaging the position of the producer. Safeguards against sub-marginal operators (a pet phrase of former Assistant Secretary Wormser) should be relatively easy to apply. At any rate, some over-all formula for all minerals should be devised rather than the poor, ragged, patchwork quilt submitted to the Congress by Interior Secretary Seaton.

At least, though, the President finally has admitted something should be done for lead and zinc.

### • Rule Changes Will Cut Mineral Barter

Since the review of the barter program by the Department of Agriculture, major changes have been

made in the ground rules. The general opinion seems to be that the new rules will cut mineral barter drastically.

For example, it must now be shown that a barter transaction will mean a *net increase* in United States exports of the particular agricultural commodity. Also, materials delivered under barter contracts may not be produced or processed in the United States. Other provisions are supposed to insure that barter will not cut into legitimate cash transactions—certainly a difficult thing to prove—though it seems obvious that barter probably would cut into regular trade.

### • No Lead-Zinc Solution In Sight

Imports of lead and zinc continue to flow into the country at an accelerated rate in an attempt to get every possible ton here before the Congress can enact the Administration's import tax bill or something similar.

The government's bill is thought to be inadequate by many of the domestic producers, though better than nothing. Long-range stockpile purchases are too small (and, anyway, will have to come to an end sometime) to sop up the surpluses. Although these purchases are of newly mined metal, many economists feel that the government, in effect, is purchasing imported metal indirectly as it flows into industry in place of the domestic metal sold to GSA. And Agriculture Secretary Benson has stated he will not, at this time at least, step up the barter program, saying, "Barter is designed to serve agriculture, not as a support program for metals." Domestic lead-zinc consumers take a very dim view of either increased tariffs or quotas as they like to buy cheap metal. They may fight the Administration bill.

### • Adequate Duty Believed Unlikely

During the recent Senate debate precipitated by the omission of tungsten funds from the 1958 fiscal appropriations Senator Carl Hayden of Arizona, chairman of the Senate Appropriations Committee, remarked that there are only two ways of aiding a domestic mining industry which is depressed by reason of cheap foreign imports, i.e., some form of subsidy (which could be direct government purchases or some type of bonus payments by the government), or adequate tariffs or quotas.

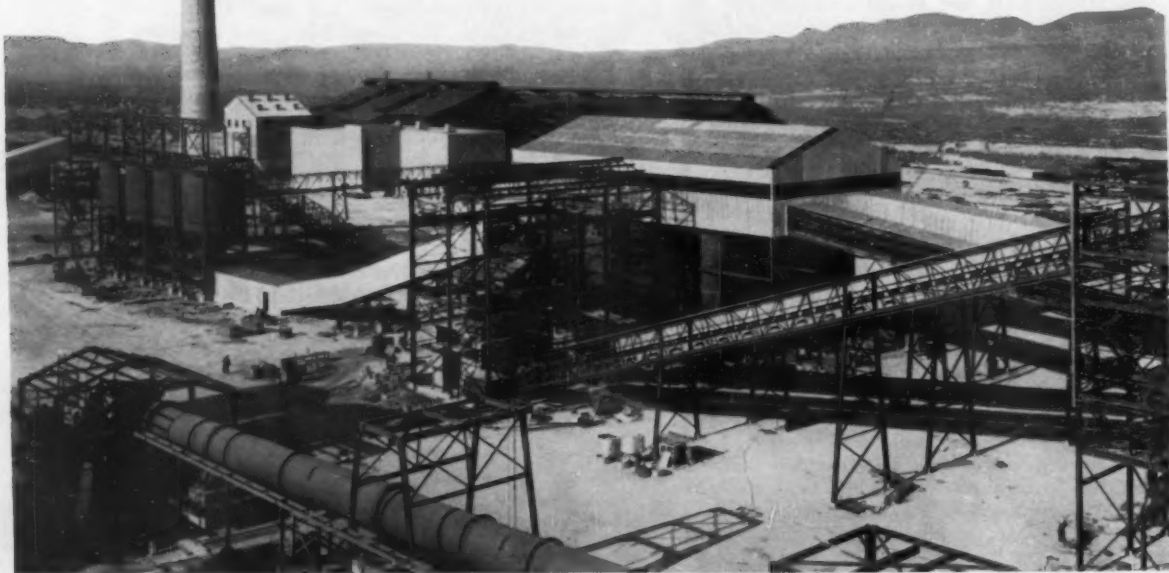
Actually, in the case of tungsten, where domestic production so far exceeds domestic consumption, tariffs or quotas would have to be set at points which would eliminate about half of the domestic production. Even such a tariff probably would permit profitable importation of cheap foreign tungsten. A tariff which would cut off imports probably still would shut down many domestic mines. Quotas no doubt would be the most reasonable means of cutting production to the desired point.

It has been pointed out that the Administration has adopted the tariff scheme for lead and zinc, so why not for other minerals? But at present world

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prices an import tax, tariff, duty, or whatever you want to call it, to balance off production would have to be set somewhere between 50 percent and 100 percent. It is most unlikely that the Congress or the government would approve such a duty.

## • Copper Statement Was Overly Optimistic

The general belief is that the copper import tax was merely reduced from 4 cents per pound to 2 cents per pound, and then suspended until copper drops below 24 cents. The facts of the matter are that by action of GATT the rate was reduced to 1.9 cents effective June 30, 1956. On June 30, 1957, it dropped to 1.8 cents and on June 30, 1958, it will be further reduced to 1.7 cents. However, should the copper price fall below 24 cents a pound the rate will revert to 2 cents per pound.

Copper producers were greatly disappointed that Secretary of the Interior Seaton in his long-range minerals program did not recommend raising the 24-cent peril point to 30 or 32 cents and increasing the effective import tax to 4 cents or 6 cents per pound. Instead, Secretary Seaton stated to the Senate Interior Committee that he had no recommendations for copper as "the current rate of domestic production is expanding and the market situation is stable under current conditions."

Considering the increase in production costs over the past years and the wild price gyrations the copper market has experienced (including the recent 2.75-cent price cut), the Secretary's statement seems to be overly optimistic, to say the least. The price will not have to drop much further to hit the peril point.

## • Tungsten Appropriation Is Dropped

From all indications, tungsten mining legislation is dead, at least for this session of the Congress. After trying three times to put through an appropriation and having it killed in the House of Representatives each time, the Senate finally has given up, and the Interior appropriations bill for the fiscal year 1958 carries a rider prohibiting the use of money for tungsten purchases. The sum of \$6,700,000 was voted for fluorspar and asbestos. Enough money remains from the previous appropriation to take care of columbite-tantalite.

The success of Representative Kirwan of Ohio in defeating every attempt of the Senate to provide money for tungsten—once by a standing vote of 156 to 47—indicates what a determined man in the right position in the House can do. Public Law 733 is an important part of the Eisenhower-Seaton long-range minerals program as openly published and endorsed by the Administration. Yet it is said that not more than 15 Republican House members voted to implement it. The Administration forces could not have worked very hard to round up votes. In fact, some observers comment that it looked like a sell-out!

Interior Secretary Seaton, when he appeared before the Senate Interior Committee on June 3, was asked what steps he would take if the Congress refused to provide funds for tungsten purchases. Seaton replied, "I would hope very much that those of us who believe in the program, and those who feel as I do about the program's being carried on, will be successful in their efforts. As to what we will do if these things do not come to pass, I would much rather reserve that for consideration, but I would

assure you, Mr. Chairman, that we would have no intention of just leaving that hanging on the vine."

## • Mineral Purchase Appropriations Explained

The Senate Appropriations Committee, in allowing \$6,700,000 for mineral purchases in the 1958 fiscal appropriation for the Interior Department, made the following comments:

"The committee recommends the allowance of \$6,700,000 for the acquisition of strategic minerals under Public Law 733, 84th Congress.

"The recommendation will provide \$4,200,000 to continue the fluorspar program and \$2,500,000 to continue the asbestos program. There are ample funds to continue the columbium-tantalum program.

"The committee recommends that no funds be allowed for the purchase of tungsten. It is the view of the committee that it is not possible to obtain funds for the purchase of tungsten under the provision of Public Law 733. In the event Public Law 733 is amended or new legislation enacted pertaining to the acquisition of tungsten, the committee would consider a request for funds, which should be submitted in the regular manner, to implement such legislation."

The committee made no recommendations as to how the tungsten section of P. L. 733 should be amended to be palatable to the House Appropriations Committee, and it is somewhat difficult to imagine how that committee can be satisfied and, at the same time, do something which would substantially aid tungsten producers.

The words "which should be submitted in the regular manner" apparently mean via the Bureau of the Budget.

The House Appropriations Committee in its report on the conference on the 1958 fiscal appropriations gave the domestic tungsten industry its quietus in the following words:

"The managers on the part of the House are in further agreement, in light of the present government inventory of tungsten, which represents an excess surplus to the long-term strategic stockpile objective, that further government purchases will not be warranted until such time as they can be fully justified as an essential defense requirement."

This language was cleverly drawn to block tungsten appropriations practically indefinitely as the Office of Defense Mobilization has frequently testified the stockpile is over-full, and that it sees no possibility in sight for expanded defense requirements.

## COMING CONVENTIONS

September 8, 9, 10, and 11. Sixth Commonwealth Mining and Metallurgical Congress, Vancouver, British Columbia. Additional meetings will be held in seven other Canadian cities ending at Halifax, Nova Scotia, October 9. Field trips to many Canadian districts will form an important part of Congress.

September 9 to 12. Mining convention of the AMERICAN MINING CONGRESS, Salt Lake City, Utah.

September 18 through 21, 1957. INTERNATIONAL MINERAL DRESSING CONFERENCE, Royal Institute of Technology, Stockholm, Sweden.

October 15 through 18. SOUTHEASTERN STATES MINING CONFERENCE and the ANNUAL MEETING OF THE SOCIETY OF MINING ENGINEERS, Hillsboro and Tampa Terrace Hotels, Tampa, Florida.

October 20 and 21, November 1. Fourth annual ROCKY MOUNTAIN MINERALS CONFERENCE, sponsored by the AIME. Cosmopolitan Hotel, Denver, Colorado.

November 2 through 8. Second WORLD METALLURGICAL CONGRESS, Chicago, Illinois.

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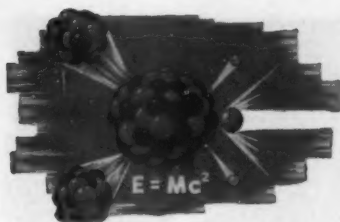
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# FISSION FACTS

Monthly Roundup of Mining News  
In the Atomic Energy Field

## Where To Look For Uranium On Colorado Plateau

BY PHILIP P. POWERS

As a result of several years of detailed geological mapping and extensive field experience, I have reached the following conclusions about uranium in the Salt Wash member of the Morrison formation in southwestern Colorado. It is hoped these observations will be valuable for others operating in the area.

### Formation of Ore Bodies

The three conditions necessary for the formation of uranium ore bodies in the Salt Wash are: 1. Permeable rocks through which ore-bearing solutions were carried. 2. A precipitating agent for uranium and vanadium to settle out of solution. 3. A trap.

Carbon was the precipitating agent. It is the residue from deteriorating vegetable matter and is present in layers of mudstone and as small specks in the medium-grained, low-lime sandstone.

### What Are the Ore Traps?

There are several types of traps as shown by the geologic cross sections.



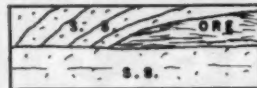
Anticlinal folds



Mudstone dikes, rolls



Lime or chert blocks



Cross bedding

### Ore Rolls

Commonly, uranium-vanadium ore of the Colorado Plateau occurs in ore rolls. They won't be explained here but they will be described. In an ore roll the ore is folded around a convex curved surface of waste sandstone. The waste roll lies horizontally and the contact surface between ore and waste is very smooth as though there had been horizontal movement along the contact. Sometimes there actually seems to be a graphitic or carbon gouge along this contact, and there are usually striations along the roll rock parallel with the sandstone bedding or along the element of the roll rock. Usually the ore lies against the roll rock on one side and the other side of the ore dissipates into the waste country rock. I have made attempts to determine if the bedding of the sandstone in the roll rock continues through the contact into the ore and this it seems to do, but the amorphous structure of high-grade ore will not usually reveal any bedding. Sometimes there is a roll rock

Mr. Powers is a mining engineer and for three years was the chief mining engineer for the Dulaney Mining Company with headquarters in Grand Junction, Colorado.

on both sides of the ore body and once in awhile the ore is on the concave side of the curved surface as shown here.

### Favorable Indications For Ore Bodies

In unmineralized areas the sandstones have a pinkish to red color and mudstones are red; but in areas where ore is found the sandstone is bleached to white and the



Trapped along fault



Ore on concave side of slip



Ore between double rolls



Ore on convex side of roll

mudstones are green, blue, black, or yellow. Often the sandstone near the ore, however, is tan or brown indicative of limonite intrusion. Mudstones immediately over or under ore bodies are usually green, black, or bluish black. The yellow mudstones are more often found in the clay dikes against which the ore is dammed. Blue copper stain is a very good ore indicator. Copper was evidently carried along with the ore solutions and deposited as a halo in close proximity to the ore by a zoning action. In mining the ore I have noticed that the copper stain is most abundant within the first 10 feet of waste around the edges and to some extent over the ore body.

Where the top surface of the Salt Wash member is exposed, the possibility of ore bodies is indicated by more intensely cracked sandstone beds. These cracks may be as close as six to eight inches apart and will stand open an inch or more. The weathered surface of these rocks will be rough instead of smooth as is the case with rock slabs overlying unmineralized areas. The rock at the edges of the cracks will appear to be curled up also. This roughness seems to be due to the differential weathering of rocks indurated by hydrothermal action. Usually there will be a gentle arching of the sandstone layers over the ore bodies at the surface. This arching seems to be due mostly to the fact that the ore occurs where the sand lenses are the thickest.

### Indications Are Not Infallible

These indicators are not infallible. I have drilled out areas that had abundant blue mudstones with some copper stains and have found only small pods of ore not large enough to be profitably mined and I have found ore in places where the surrounding rock appeared unfavorable to within perhaps 20 feet of an ore body. In the first instance, however, I believe that the hydrothermal solutions passed through the area but that there was no trap present to keep the ore from continuing on its way. Perhaps the ore can migrate to a considerable distance even after it has been precipitated.

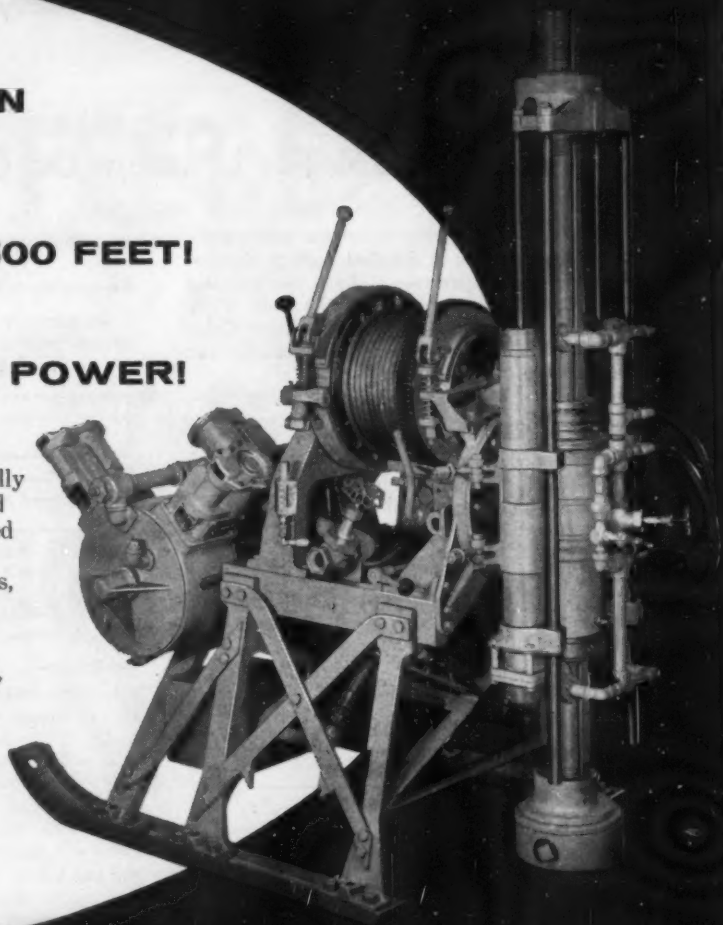
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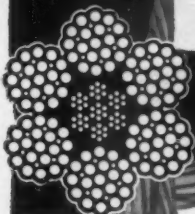
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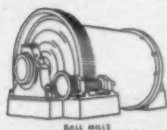
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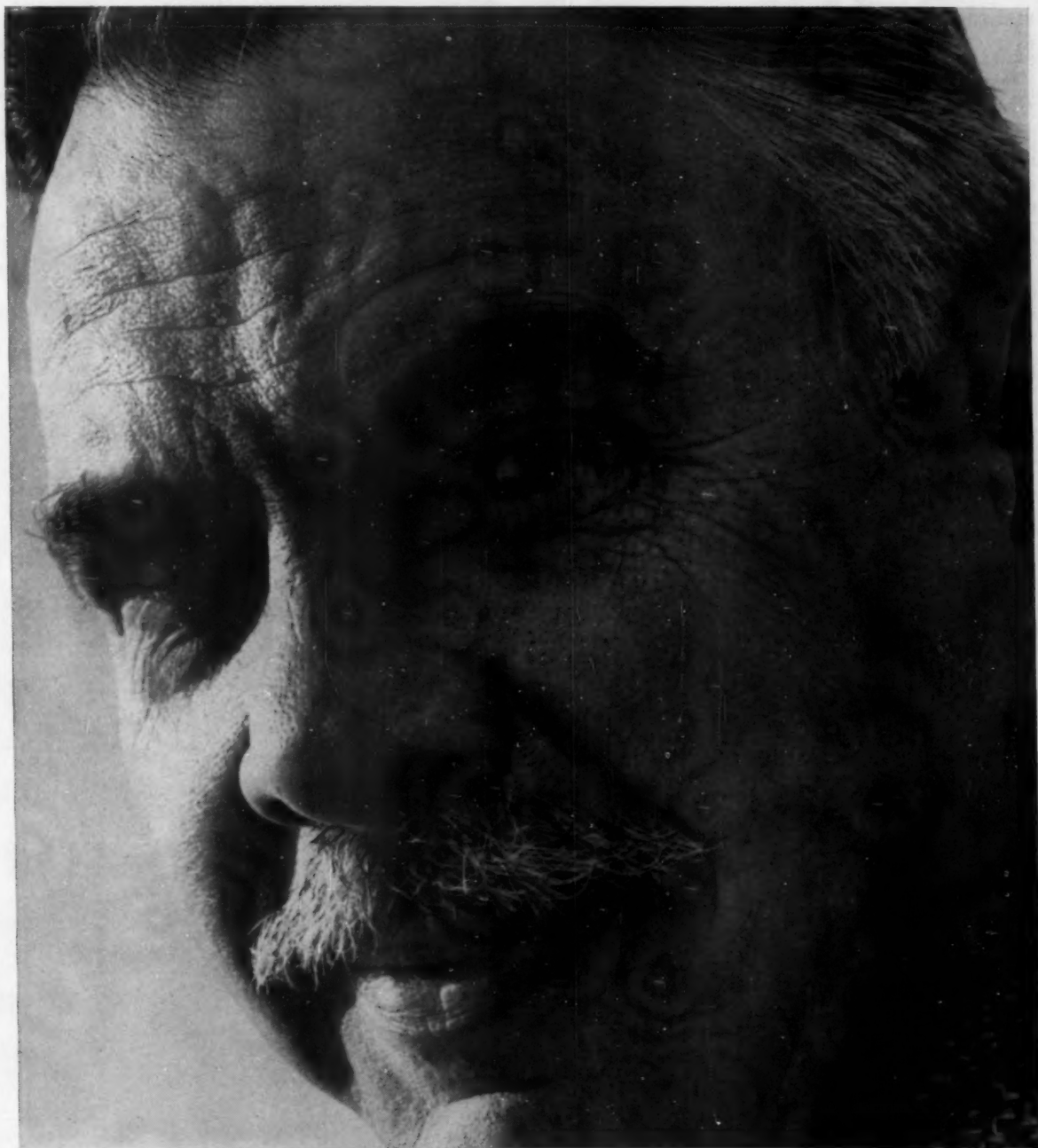
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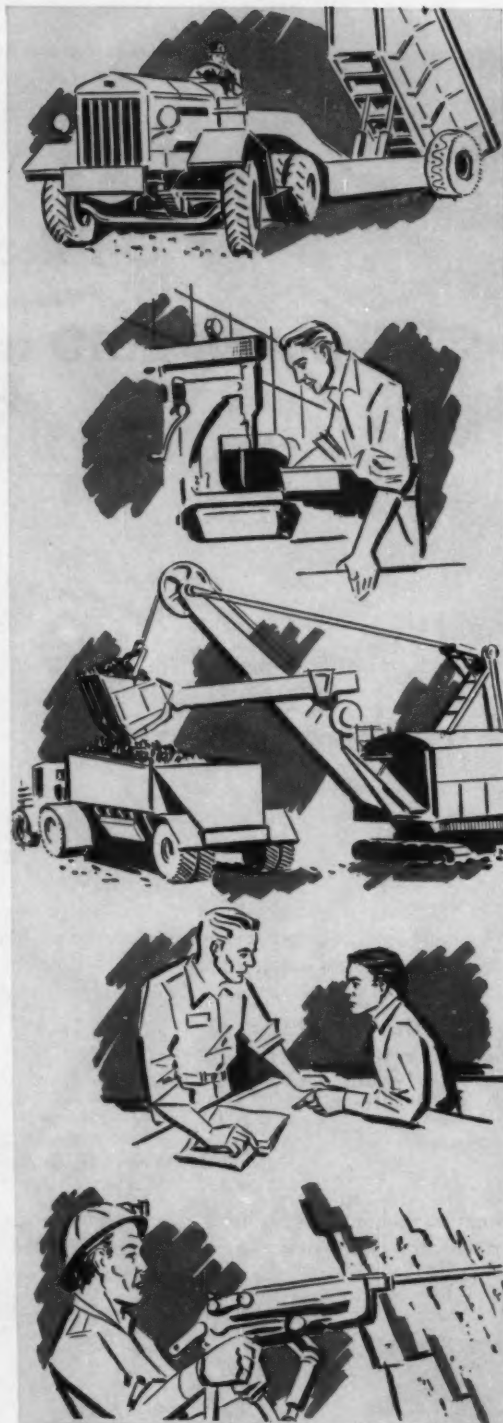
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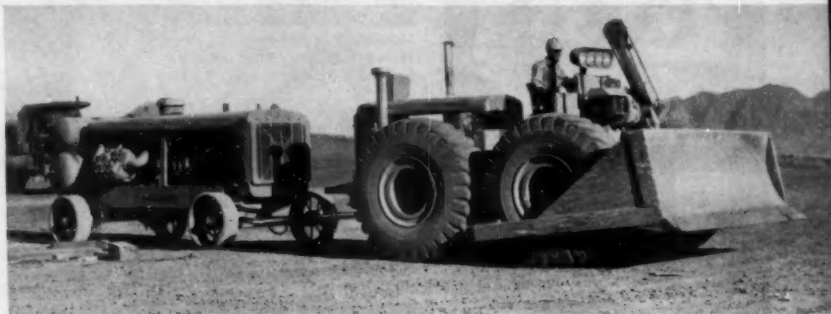
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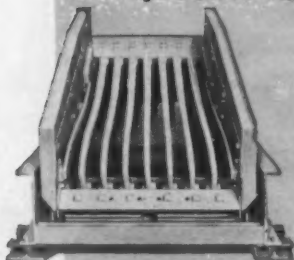


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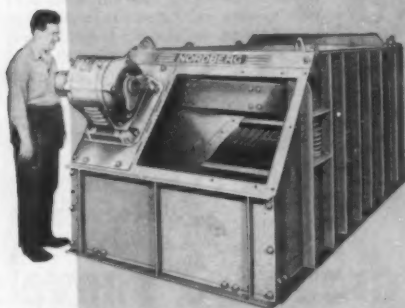
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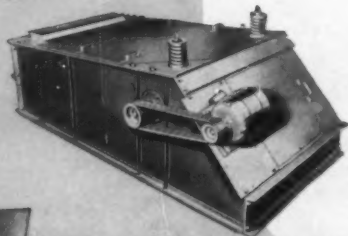
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push-power at  
top efficiency**

Compared to other graders, Adams heavy-duty machines deliver a greater proportion of developed engine-power to tandem wheels. An Adams gives you this bonus work-power because all gears and shafts in transmission, final drive, and tandems turn on anti-friction bearings.

## **Push bigger loads, faster**

Because the Adams' drive has roller- and ball-bearings throughout, very little of its horsepower is lost thru friction. More thrust is made available for pushing bigger loads, for blading deeper, for working faster. Furthermore, with an anti-friction drive, your graders' fuel-cost per unit of work done is correspondingly lower. Finally, longer bearing life cuts maintenance expense and downtime for repairs.

## **Transmission delivers maximum torque**

The Adams transmission provides more power-speed combinations than other graders, with 15 speeds, so you can do every grading operation at fastest practical rate. At each speed, transmission delivers maximum torque, because all gears and shafts turn on anti-friction bearings. It is fully constant-mesh; gears always engaged for fast, easy

All gears and shafts in the Adams transmission turn on ball-, needle-, roller-, and tapered-roller-bearings.

Main rear axles are mounted on anti-friction bearings, and carry no grader weight. Instead, rear-end weight is supported on concentric, tubular axle carriers. Inner axle carriers are bolted to tandems; outer carriers to final drive housing. Thus, tandems can oscillate freely — without putting stress on main axles. 100% anti-friction drive increases available work-power, reduces operating costs.



gear-shifts without clashing. Crown-shaved helical gears mate precisely, run continuously in oil, do not "howl", give extra-long life.

## **Rear axle carries no weight**

In heavy-duty Adams graders, 80 to 190 hp, the main rear axles are full-floating — they do *not* carry weight of the grader. Instead, rear-end weight is borne by sturdy axle carriers, consisting of two concentric, tubular-shaped, steel housings — one inside the other. Tandems oscillate at will on the two axle carriers. Grader keeps all four tandem wheels on the ground, even in roughest terrain, driving, pushing, working all-the-time.

Inside the axle-carriers, driving-axes float "free", mounted in anti-friction

This Adams 550 motor grader boosts pit production. It keeps haul-roads smoother, carves out new roads easier, opens snow-clogged routes earlier, than ordinary graders of similar size and power. It cleans-up around pit and plant fast, and maintains better drainage. At every speed, Adams transmission, final-drive, and tandems deliver maximum engine-power to wheels, because all gears and shafts turn on ball- and roller-bearings. Control clutches and shafts operate on anti-friction bearings.

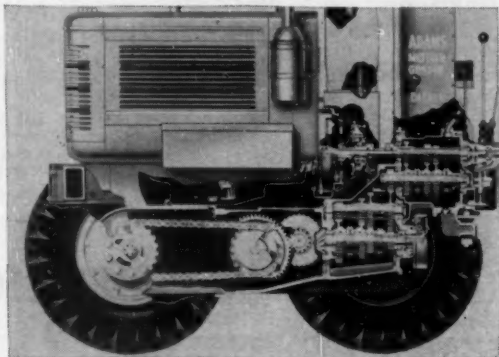
bearings. They are fully protected from abnormal shocks and stresses of travel over rough terrain, secure against breakage and undue wear.

## **Ask for demonstration**

See how Adams' 15\* speeds, with power delivered thru 100% anti-friction drive, give these machines extra push-power, a capacity for work no other grader can match. Let us explain how an Adams saves you money on fuel and repairs, how it can keep producing for you at lowest cost. 6 models: 60 to 190 hp. You have a choice of General Motors or Cummins diesel engines on the 5 larger Adams grader models. Write for all the facts.

*\*190 hp POWER-Flow 660 provides infinite number of power-speed combinations (to 27.4 mph) thru torque converter. 60 hp Model 220 has 9 speeds forward, with optional creeper gears. It is the best in its class.*

Adams, POWER-Flow—Trademark AG-1231-M-br



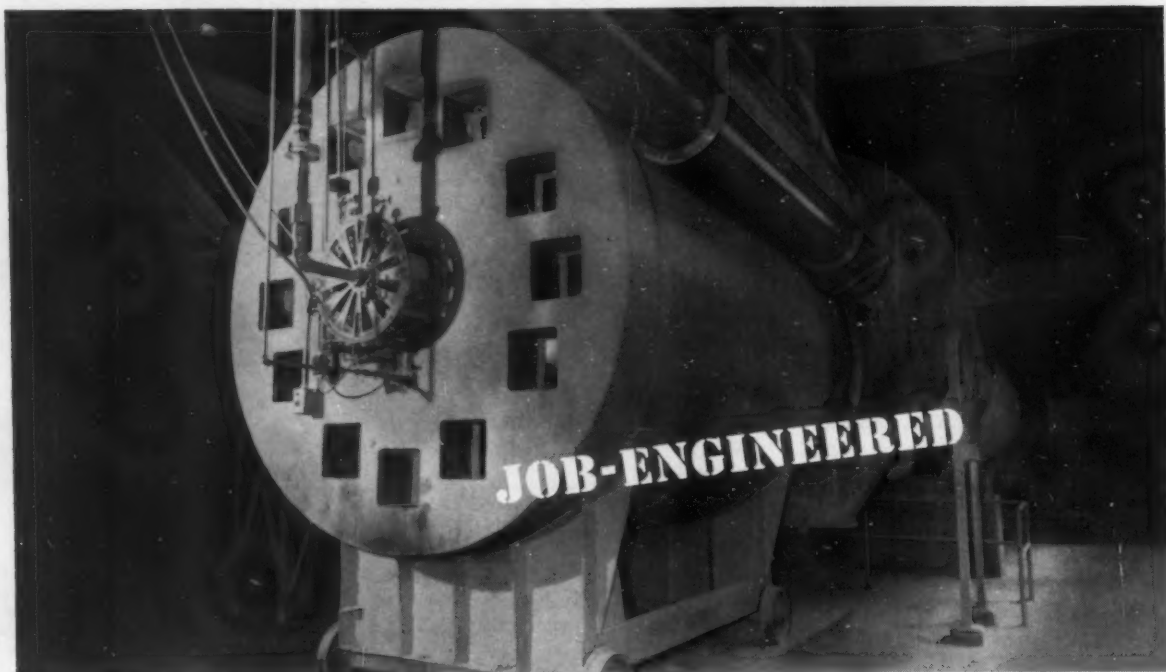
**LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS**

**A Subsidiary of Westinghouse Air Brake Company**

**Where quality is a habit**

Helping others produce a better product...

**STANDARD HERSEY**  
**DRYERS**



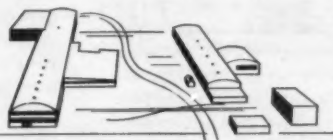
**MINING FOR FOOD TO FEED THE EARTH—  
NEW CARLSBAD PLANT OF NATIONAL POTASH  
IS ON STREAM WITH STANDARD-HERSEY DRYERS!**

Deep into the earth—1800 feet, deepest in the nation's potash industry—National Potash near Carlsbad, N. M., is mining for food to feed the earth, so that the earth will feed man better! Designed refinery capacity is 400,000 tons per year. And at the heart of this operation are 60-foot-long twin rotary dryers—*job engineered* Standard-Hersey dryers—designed and built by Standard Steel Corporation... a world leader in designing and manufacturing dryers, granulators, and coolers. Wide range and flexibility in Standard-Hersey dryers help you to produce almost any desired grade of fertilizer.

No matter how tough the problem, Standard Steel's *job engineering* solves it.

**IF YOU HAVE A PROCESSING PROBLEM!**

Standard Steel welcomes the opportunity to discuss with you any problems you may have in drying, cooling, or calcining. Our laboratory pilot testing equipment determines beforehand the best equipment for your problem.



**STANDARD STEEL ACQUIRES  
LEADER IRON WORKS**

To meet the ever increasing needs of its world-wide customers, Standard Steel Corporation recently purchased the Leader Iron Works at Decatur, Illinois. Founded in 1888, Leader is well known for its work in the food, chemical and petroleum industries. In addition to its customary fabrication Leader will now manufacture Standard's line of heavy processing and road construction equipment.



**STANDARD STEEL CORPORATION**

General Offices and Factory, 5031 Boyle Avenue, Los Angeles 58, California

**LEADER IRON WORKS**

Midwest Offices and Factory  
Decatur 31, Illinois

**ROTARY DRYERS • KILNS • COOLERS • ASPHALT PLANTS**

65 belt hp!  
up to 15,500 lb drawbar pull!  
forward speeds from 1.5 to 5.5 mph!  
reverse to 4.1 mph!

**ALLIS-CHALMERS**

# HD-6

**Tractor-Dozer**



**MORE POWER—BETTER DOZING SPEEDS—  
BIG-DOZER DESIGN—NEW HANDLING EASE!**



Only dozer of its size with these basic advantages . . . engine-mounted rams, long push beams, fewer linkage points (only 2 instead of 5 or 6). These big-dozer features all combine to provide more accurate, gouge-free dozing . . . longer equipment life.

Convenient rotary-valve blade control makes the HD-6 the easiest handling dozer of its size. With more than 5½ feet of track on the ground, it has outstanding flotation . . . yet turns easily in any terrain. The HD-6 also combines large, low-set front idlers with a blade snugged close to the radiator guard . . . to provide balance that means better dozing, more work done under any conditions!

You can see it . . . but  
there's only one way to  
prove it—on **your** job!

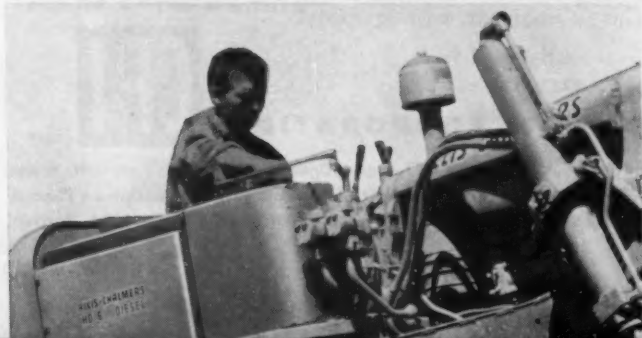




Illustration from Agricola's De Re Metallica (1621)

## Arduous Work—Small Production

In centuries past, the production of metals could be measured by handfuls. Small wonder when comminution was done by a hammer and beneficiation was limited to hand-picking.

Fortunately, today's modern processing plants treat many tons of ore and produce many tons of metals, thus making possible our "metal age" civilization. This

large production requires modern grinding methods which in turn utilize such grinding media as those produced by CF&I. The grinding balls and grinding rods produced by CF&I are *always* made from special analysis steels with the ideal balance between toughness and hardness to assure optimum grinding ability and maximum wearing ability.

**THE COLORADO FUEL AND IRON CORPORATION**



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You can see it, but there's  
only one way to prove  
what the **HD-6** can do for you!



**Call your nearby**

**Allis-Chalmers construction machinery dealer  
—he'll demonstrate one on your job NOW!**

**... or send us this**

**Allis-Chalmers  
Construction Machinery Division**  
Milwaukee 1, Wisconsin

Gentlemen:

Please have the Allis-Chalmers construction machinery dealer  
serving my area arrange a demonstration of the HD-6 tractor-  
dozer for me.

Name

Address

City  State

Type of Work

# HIGH IN

**P&H**

## ELECTRICS

### ARE WORKING FOR SOUTHERN PERU COPPER

In their operations as high as 13000 feet in the Peruvian Andes at Toquepala, Peru, Southern Peru Copper is using P&H Electric Shovels. Their maximum availability and minimum maintenance are vital to high production. In addition to 10 P&H Model 1800 machines, Southern Peru Copper has purchased 23 P&H diesel powered excavators.

*Only P&H Electric Shovels have these outstanding exclusive features.*

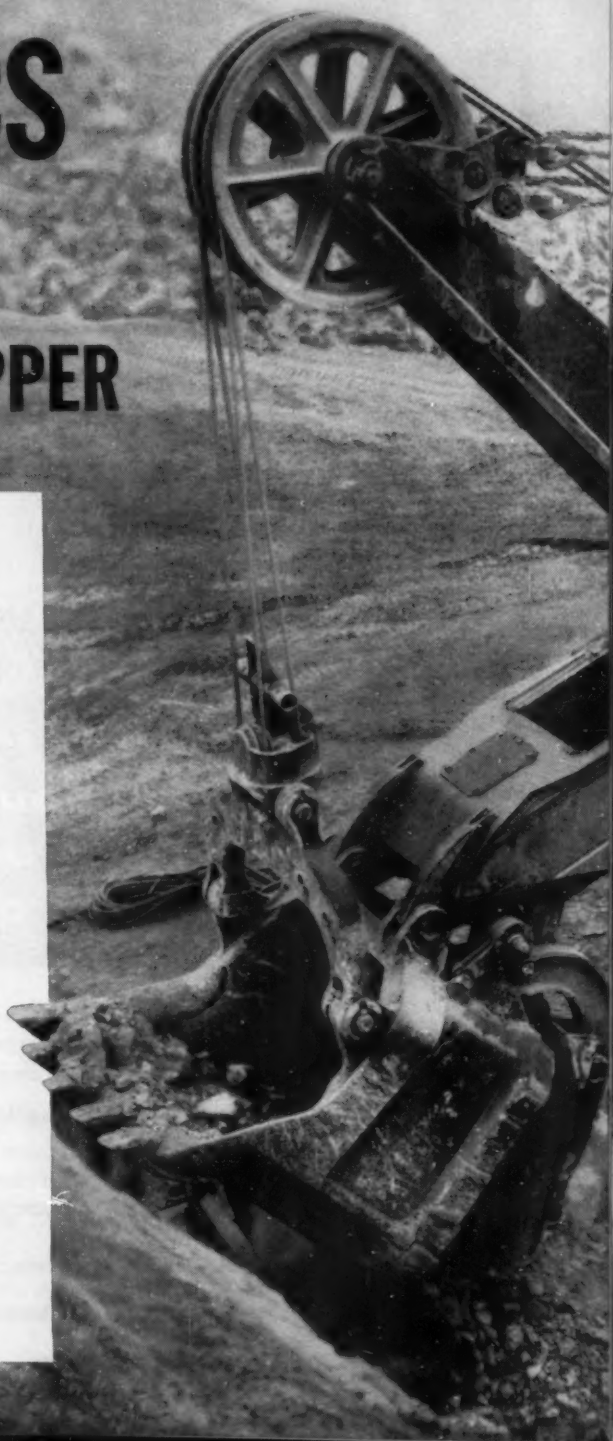
**MAGNETORQUE®** . . . the electro-magnetic type coupling that transmits power from the hoist motor to the dipper for faster action, eliminating shock and impact to the hoist gear train and motor. Response is immediate to varying load conditions.

**ELECTRONIC CONTROLS** . . . providing the fastest action of any type of control available on electric shovels. All motions are smoother, resulting in consistently higher output.

Whether it's big P&H Electric Shovels from 3½ through 8 cu. yds., or smaller P&H excavators, it will pay you to choose from the P&H complete line. P&H offers single source responsibility for all your open pit mining needs.

## HARNISCHFEGER

CONSTRUCTION & MINING DIVISION  
Milwaukee 46, Wisconsin



# THE ANDES



8 cu. yd. P&H Electric Shovel, Model 1800

# "THIS D9 HAS DONE EVERYTHING WE HAVE TRIED IT ON YET!"

V. D. Eachus, Eachus Equipment Rental Co., Las Vegas, Nevada



This CAT® D9 Tractor with No. 9S Bulldozer is stripping overburden from gypsum in the Blue Diamond Corporation's operation, Blue Diamond, Nevada. The material is clay and rock. Says V. D. Eachus, owner of the unit: "This D9 has done everything we have tried it on yet. It is a big tractor and it does a big job. I have owned Caterpillar-built machines now for about fifteen years and find they stand up best on the toughest of work. Our dealer service is also tops."

That's typical of other reports about the Turbo-charged D9. In every way, it's a big machine for your biggest, toughest jobs. It packs plenty of power—260 HP at the drawbar and 320 HP at the flywheel. Its turbocharger, driven by the engine exhaust, packs air into the engine according to engine load, not engine speed, for greater efficiency. With bulldozer it weighs 35 tons, yet is as easy to maneuver as smaller machines, with hydraulic boosters providing power for steering, braking and master clutch use. And it's

easy to service—for example, oil clutch, torque converter, transmission and steering clutches each can be moved individually.

To match your job needs, the D9 is available with torque converter or direct drive with oil clutch. For complete information, see your Caterpillar Dealer, who's a source of efficient service and parts you can trust. Ask him to show you facts and figures proving the D9 can step up your production. Better still, name the date—he'll be glad to demonstrate!

Caterpillar Tractor Co., San Francisco, Calif.; Peoria, Ill., U. S. A.

## CATERPILLAR\*

\*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

**WANTED—  
THE HARD WORK**



## Du Pont **NILITE**\* for safer, powerful, low-cost shooting in dry work!

**"Got any medium or large diameter dry holes to shoot?** Man, if you don't use me, you're just plain wastin' money! Me? I'm **NILITE**: Du Pont's new ammonium nitrate blasting agent. Just pour me alone in easy shooting holes or as a top load in medium-hard ones. You'll get excellent spreading action, thanks to my over-60% weight-strength—and believe me, my price tag's low!

**"Your work'll be safer, too.** Caps, friction, shock and Primacord don't affect ol' **NILITE**. I'm also non-headache-producing, so your men can load faster, with an extra margin of safety. (For maximum safety, initiate me with Du Pont's "Nitramite®" Primer, although explosives of at least 50% strength can also do it.)

**"I come two ways:** in non-expanding round burlap-asphalt bags of 7", 8" and 9" dia. (larger sizes on request) for loading directly into holes—and bulk-packed, in 50- and 100-lb.

\*Registration applied for.

multi-wall paper sacks that resist tearing and abrasion, for pouring into holes.

**"Cut shooting costs—**get all the power you need—by using me. That's **NILITE**: another field-tested Du Pont product you can bank on!" Call our man or write: E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

### **DU PONT BLASTING AGENTS**

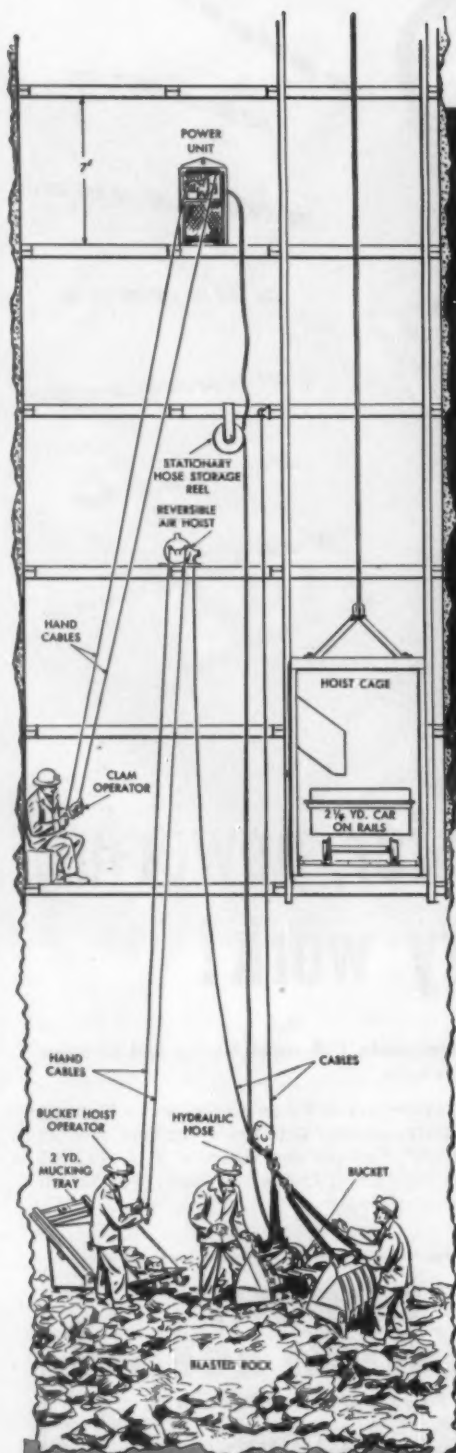
Products of Du Pont Research



BETTER THINGS FOR BETTER LIVING... THROUGH CHEMISTRY

# SINK SHAFTS FASTER

## WITH BUCYRUS-ERIE HYDROMUCKER



Here is a hydraulic shaft mucking device that increased production 35 per cent at one mine — and freed 30 per cent of the manpower for other work! Let's look at the reasons why:

- 1 The hydraulically operated clamshell bucket digs into the muck pile — does not pull away during closing as do rope-reeved clamshells.
- 2 Clamshell operator can be stationed on a shaft set above the muck pile — out of the way, yet in excellent position to see the operations.
- 3 Muck can be loaded by the clamshell into a tray or other container which is placed near the digging. When full, this unit is dumped into a skip or car and hoisted to the surface.
- 4 Very little preparation is necessary to start the mucking cycle. Only the container and hydraulic bucket are hoisted out of the way during blasting, so only minutes are required to connect the hydraulic line and begin mucking.

Sink your shafts the faster, easier, mechanized way with Bucyrus-Erie Hydromucker —  $\frac{3}{4}$ - or  $\frac{1}{2}$ -yd. capacity. Write for details or see your Bucyrus-Erie distributor.

211H57

**BUCYRUS  
ERIE**

SOUTH MILWAUKEE, WISCONSIN

## ENGINEER'S FIELD REPORT

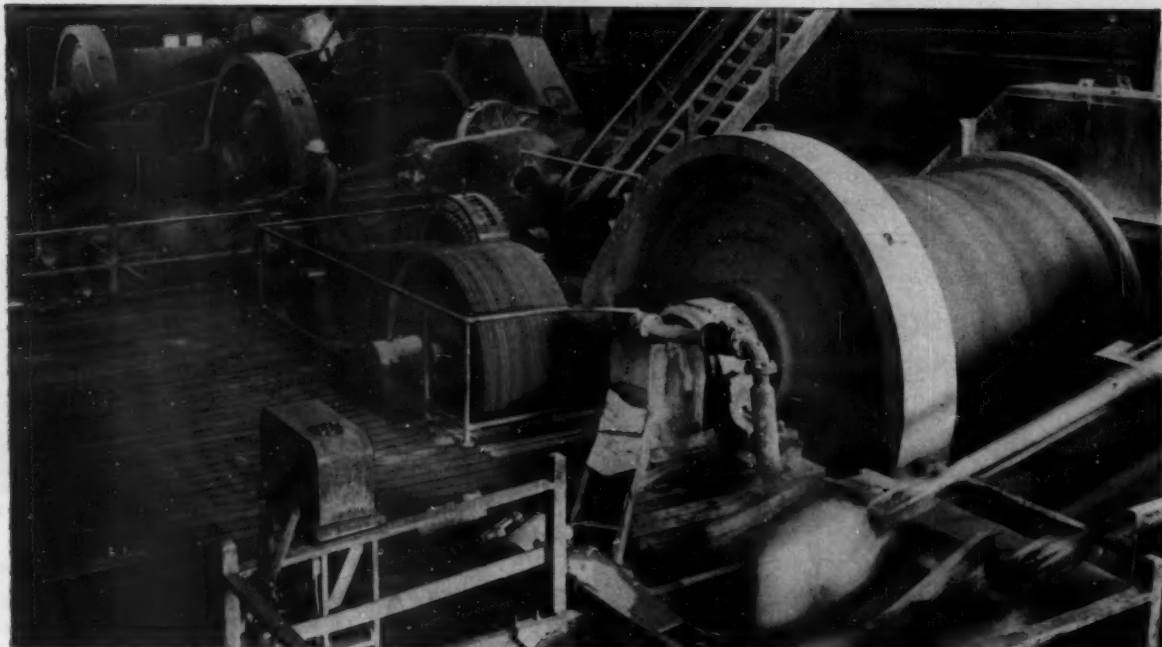
PRODUCT CHEVRON GEAR COMPOUND

BAGDAD COPPER CORP.

FIRM

Bagdad, Arizona

# Not one gear failure using Chevron Gear Compound



During 5 years that Bagdad Copper Corp. has used Chevron Gear Compound (formerly Calol) in its ore concentrator mill, not a single gear has broken down, required repair or replacement as a result of

lubricant failure. Despite continuous operation and extreme pressure, gear teeth show no scuffing or galling. Mill moves some 4,000 tons of ore through its four ball mills and classifiers every 24 hours.



Enclosed gears of firm's four Western Machinery classifiers are lubricated with Chevron Gear Compound. Copper ore is pulverized in ball mills by tumbling with 32 tons of 3" steel balls. Classifiers then screen out oversize pieces for return to ball mills. Reduction gear box which Master Mechanic Al Smith is inspecting (above) powers connecting arms which agitate mixture of pulverized ore and water in classifier.



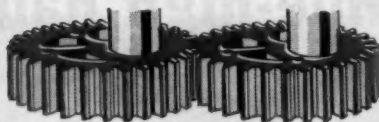
TRADEMARK "CHEVRON" AND "CHEVRON" DESIGN REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA,  
225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY,  
P. O. Box 780 • Denver 1, Colorado

STANDARD OIL COMPANY OF TEXAS  
P. O. Box 862 • El Paso, Texas

### Why Chevron Gear Compound protects enclosed gears



- Tough film protects gear teeth against scuffing and scoring under severe shock, load conditions.
- Highly adhesive...clings to gear teeth and bearings, even under wet operating conditions.
- Oiliness additive reduces friction.

For More Information on this product contact your nearest representative, or write direct to any company listed.



**Loading tungsten ore** near Glen, Montana, at the Ivanhoe Mine of Minerals Engineering Company.

(Left) **Winding mountain roads** and steep grades call for trucks with top performance and alert, skillful drivers.



## Mile-high hauling in the Rockies... stern test for men and trucks

Sixteen hours a day—6 days a week—52 weeks a year—these Mack six-wheelers haul 18-ton loads of precious tungsten ore nine miles from mine to processing mill. The mine is at 7,100 feet elevation; the mill at 5,200 feet. It's a tough haul over adverse terrain... especially hard on trucks during the winter months.

Mr. W. M. Gaylor — contract hauler from Dillon, Montana — says: "Considering that each Mack working the Ivanhoe Mine averages 30,000 tough miles a year,

engine down time has been very small. What also impresses me is the Mack four-wheel-drive bogie rear ends. In three years of operation, there has not been a single second of down time on these rear ends. The same applies to king pins and bushings.

"When you consider that our diesel fuel mileage runs 6½ miles per gallon, you have to agree these Macks are sure hard to beat for dependable and cost-saving hauling."

Mr. Gaylor speaks from experi-

ence about the superiority of Mack trucks. Want more information? Let your local Mack representative show you how Macks have paid off for operators in your area. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

4798

**MACK**  
**first name for**  
**TRUCKS**



"Talk up" increased  
production—greater  
safety...with these

**M - S - A**

.....  
**COMMUNICATION**  
.....

**SYSTEMS**

#### M-S-A MINEPHONE

Dispatcher sends orders instantly and simultaneously to all motormen with this modern, underground two-way voice communication system. Motormen receive and reply while trips are in motion—keep haulage movements coordinated with production demands. This results in smoother, faster, and more continuous trip movements throughout the mine.

Messages clear tracks for outgoing loaded trips and incoming empties. This system puts an end to traffic tie-ups, errors and accidents; prevents excessive stop-and-start strain on equipment. Write for more detailed information.



• Dispatcher sends orders to motormen . . . routes right-of-way traffic . . . receives reports on positions and station conditions.

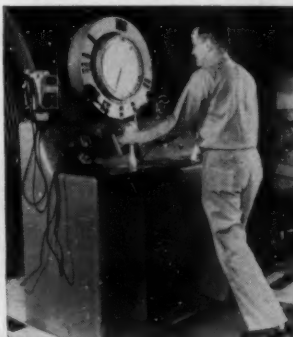


• "Jeep" operator requests instructions from dispatcher and maintenance shop for section assignment . . . speeds emergency repair.

#### M-S-A HOISTPHONE

For accurate, instant response between the hoisting engineer and cage, here's the voice communication system to install. Whatever the job—load leveling—shaft repairs—shaft inspection trips—passenger transportation—the M-S-A Hoist-Phone provides better safety and efficiency through dependable, continuous two-way voice communication at any level, and while the cage is in motion.

Requires no special training . . . simple to use . . . dependable in operation. Write for further information.



• The hoisting engineer is able to control all movements of the cage by communicating with cage rider over the M-S-A HoistPhone.



• Worker uses microphone in cage to tell the hoisting engineer where he wants to go. Loudspeaker mounted on top of cage.



When you have a safety problem, M-S-A is at your service . . .  
our job is to help you

#### MINE SAFETY APPLIANCES COMPANY

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At Your Service: 77 Branch Offices in the United States and Mexico

#### MINE SAFETY APPLIANCES CO. OF CANADA, LTD.

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## There's a quality-built LIMA to fit every mining job

You get down to pay dirt faster when you have power-packed Limas digging for you. Limas are rugged machines designed to master the toughest digging jobs . . . they strip away overburden fast in big, profitable bites . . . they get coal and ore loaded fast. Built in sizes from  $\frac{1}{2}$  to 6-cu. yds., there is a Lima matched to your mining operation.

**These quality features are built into job-matched Limas!**

air-controlled clutches on the larger types for ease of control and instant response.

anti-friction bearings in the drums and other critical parts to keep wear at a minimum and lessen lubrication problems.

dirt seals and retainers in crawlers exclude abrasive material.

torque converter drive (optional) for greater power without stalling.

big-capacity drums for longer cable life.

And, remember, wherever you are, you can depend on skilled service and nearby service stocks of parts to keep downtime to a minimum. See your Lima distributor for complete information about the machine best fitted to your needs . . . or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

Cable Address: LIMASHOVEL, Lima, Ohio, U.S.A.

**LIMA** SHOVELS • CRANES • DRAGLINES • PULLSHOVELS  
**BALDWIN - LIMA - HAMILTON**  
 Construction Equipment Division — LIMA WORKS  
 OTHER DIVISIONS: Austin-Western • Eddystone • Electronics & Instrumentation • Hamilton • Lowry-Hydropress • Madison • Patten • Standard Steel Works



Lima Type 34 Paymaster Dragline working in lead and zinc tailings near Wallace, Idaho. Machine has 45-ft. boom.



Lima Type 1201 Shovel stripping overburden in iron ore operation near Kinney, Minn. Machine is equipped with 32½-ft. boom, 22-ft. dipper handle, and 3-cu. yd. dipper.



Lima Type 2400 High Lift Shovel with 60-ft. boom, 45-ft. dipper handle, and 4½-cu. yd. dipper, mining coal near Holloway, Ohio.



**WHEN THE DIGGING  
GETS REALLY TOUGH**



Patent  
Applied for

## **ESCO WEAR CAPS CUT ADAPTER REPLACEMENT COSTS!**

ESCO replaceable Wear Caps protect point adapters for long-wearing life.

Wear Caps are rugged, heat treated, high Brinell, 12M Castings, that slip over the top front of the adapter to protect the adapter from abrasive wear.

**Replace the cap and not the adapter.**

Designed specifically for large shovels, to cut adapter replacement in hard rock and other extreme conditions.

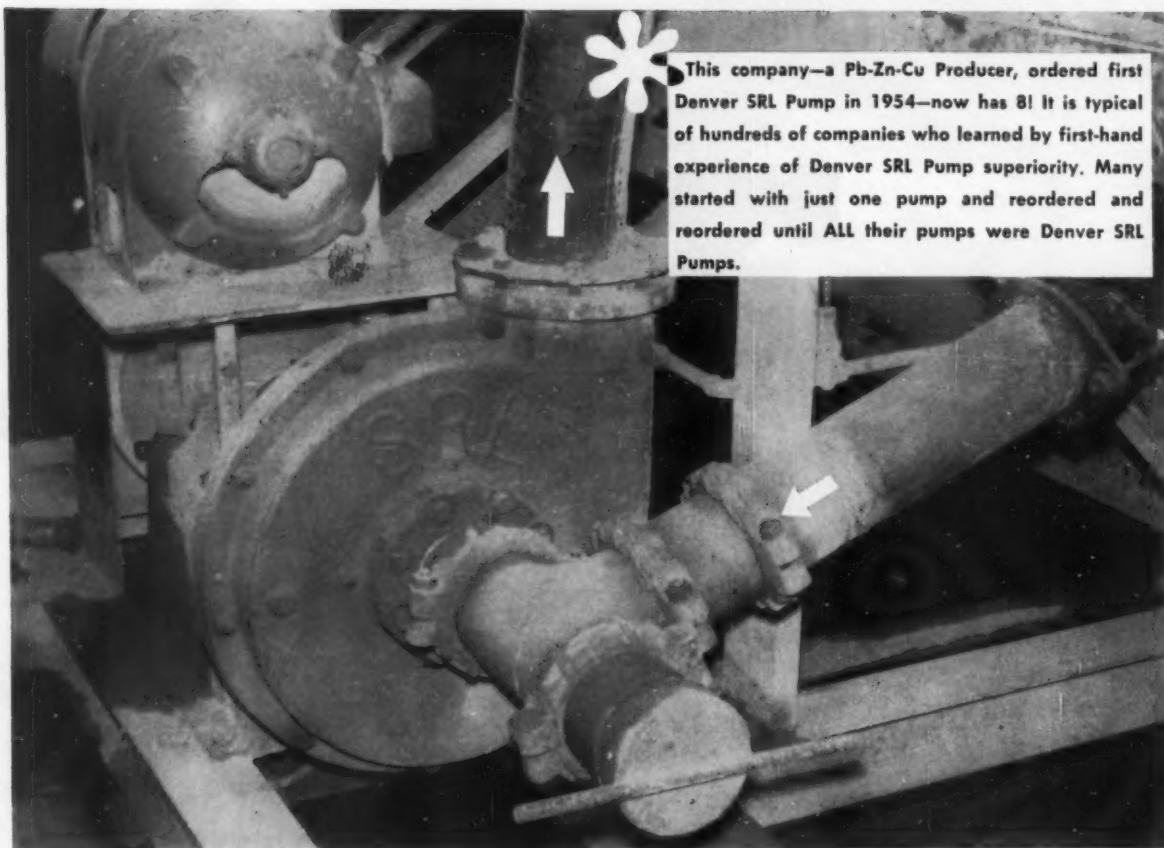


**See your nearest ESCO dealer.  
Ask for ESCO Tested Points Catalog No. 187.**



**ELECTRIC STEEL  
FOUNDRY COMPANY**

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MFG. PLANTS AT PORTLAND, ORE. AND DANVILLE, ILL.  
Offices in Most Principal Cities  
ESCO INTERNATIONAL, NEW YORK, N. Y.  
IN CANADA ESCO LIMITED



This company—a Pb-Zn-Cu Producer, ordered first Denver SRL Pump in 1954—now has 8! It is typical of hundreds of companies who learned by first-hand experience of Denver SRL Pump superiority. Many started with just one pump and reordered and reordered until ALL their pumps were Denver SRL Pumps.

— to reduce your pumping costs,  
ask for our recommendation  
about

# DENVER SRL Pump

COMPARE SPECIFICATIONS, PRICE AND PERFORMANCE

## DISTINCTIVE FEATURES

1. **LOW COST**—initially as well as for maintenance and power.
2. **LONG SERVICE** — rubber bonded - to - steel parts last longer, means less down-time for maintenance.
3. **LOW HORSEPOWER** — the greater accuracy of molding rubber means higher pumping efficiency — saves up to ½ on power.
4. **SIMPLE CONSTRUCTION** — only few parts, rugged design. Mechanical seal now available.

*"The firm that makes its friends happier, healthier and wealthier"*



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# Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

August 1957

## —INTERNATIONAL PANORAMA—

**JEFFREY CITY, WYOMING**—Western Nuclear Corporation has placed its new uranium plant in operation here to treat Gas Hills ore. It is Wyoming's first uranium plant and the 13th in the United States.

**CARLSBAD, NEW MEXICO**—To meet the increased demand for granular potash products, the Potash Company of America and International Minerals and Chemical Corporation are putting in new plants to produce sized fertilizer. Total plant's cost will be nearly \$2,000,000.

**DULUTH, MINNESOTA**—Iron ore shipments from Great Lake ports are running well ahead of last year's shipments despite the late start of navigation. Last year shipments were drastically cut during the steel strike in July and August.

**GRANTS, NEW MEXICO**—Calumet & Hecla, Inc. is preparing its 500,000-ton Ambrosia Lake uranium ore body for a daily production of 500 tons by early 1958. Ore will be transported to the surface up an inclined haulage way.

**LANDER, WYOMING**—Phelps Dodge Corporation has exercised options to control extensive uranium reserves of Wyoming Uranium Corporation in the Gas Hills. Value of high- and medium-grade ore indicated by Phelps Dodge's drilling has been estimated at \$42,618,000.

**KELLOGG, IDAHO**—Sunshine Mining Company has signed a contract to deliver nearly \$1,000,000 worth of metallic antimony to the national stockpile in the next 18 months. Sunshine will produce the 1,500 tons as a byproduct from silver-bearing tetrahydrite concentrates.

**AURORA, MINNESOTA**—The first shipment of iron ore has been made from Oliver Iron Mining Division's reactivated Stephens mine. Shipments are scheduled for 2,600,000 tons of ore from this mine this year.

**TONOPAH, NEVADA**—The Fresnillo Company, prominent Mexican base metal producer, and owner of the Round Mountain Dredging Corporation, plans to reopen the Round Mountain gold mine and rebuild the gravel washing plant.

**URAVAN, COLORADO**—Union Carbide Nuclear Company has increased capacity of its uranium-vanadium plant here to 2,500 tons per day.

**HAYDEN, ARIZONA**—A 50 percent expansion in milling capacity is underway here at the Ray Mines Division of Kennecott Copper Corporation. A new crushing plant will be built; new grinding and flotation units will be added to the existing mill circuit.

**WILMINGTON, NORTH CAROLINA**—Allied-Kennecott Titanium Corporation will build its new titanium metal plant on the Cape Fear River near here. The company was formed by Allied Chemical & Dye Corporation and Kennecott Copper Corporation to produce and fabricate titanium.

**HAVANA, CUBA**—Standard Oil Company of Indiana is exploring for uranium on 25,000 acres in Camaguey Province. Oil and gas exploration in the area indicated possibility of uranium deposits.

**ROPER BAR, NORTHERN TERRITORY, AUSTRALIA**—Broken Hill Pty. Co., leading Australian iron and steel producer, has discovered large low-grade iron ore deposits near here. The deposits are near tidewater.

**SALT LAKE CITY, UTAH**—Vitro Minerals Corporation is reported to have taken a 30-day option on a group of uranium claims in the East Gas Hills district of Wyoming. The property is held by Shoni Uranium Corporation.

**AMOS, QUEBEC, CANADA**—Canada's latest staking rush is taking place in the Mattagami Lake area north of here following discovery of massive sulphides in a drill hole on an airborne anomaly.

### Lead-Zinc Hearings To Be Held This Month

The House Ways and Means Committee has scheduled hearings on the lead-zinc excise tax provisions of the Long Range Minerals Program for August 1 and 2. Originally the Committee had turned down requests for hearings on this legislation but strong pressure was brought on the Committee for this latest action. Washington observers believe an important step has been taken to insure Committee approval and eventual passage of the Program.

Last month MINING WORLD discussed the details of the proposed legislation on pages 59, 60, and 61. Turn to pages 54, 55, 56, and 57 of this month's issue for a roundup of industry comments on the Program.

### Phelps Dodge Exercises Wyoming Uranium Option

Phelps Dodge Corporation has exercised its option to acquire the properties of Wyoming Uranium Corporation in the Crooks Gap area of Fremont County, Wyoming. The copper company has had a concentrated surface drilling program underway on the property for more than a year. The majority of the drilling was confined to Sec. 16, T. 28 N., R. 92 W., a state school lease held by Wyoming and from which some ore had been shipped before Phelps Dodge took over the exploration work.

On the basis of exploratory drilling PD estimated that reserves of uranium ore totaling about 200,000 tons of 0.4 percent uranium oxide were indicated. Hepburn T. Armstrong, president of Wyoming Uranium, says that on the basis of independent engineering calculations the value of the ore drilled out to date is about \$42,618,000. This figure includes the 200,000 tons of high grade, and an additional tonnage of 1,470,000 of medium grade ore. The over-all average grade of the ore is 0.30 percent uranium oxide. Mr. Armstrong also stated that a further engineering study by Minerals Engineering Company of Grand Junction, Colorado led to a calculation of 2,008,900 tons of potential ore with prospects favorable for an even larger ore body.

Under terms of the option agreement announced last year, a new company would be formed in the event the option were exercised, with PD holding 51 percent of the stock and Wyoming Uranium 49.

Next Month . . .

Dual Process—Another Metallurgical First for Inspiration Copper



OVER-ALL VIEW of M. A. Hanna Company's new Hunner plant in Coleraine, Minnesota. Processing hematite-bearing iron ore, the plant beneficiates 800 long tons per hour.



BENEFICIATED IRON ore from the new Hunner plant is stockpiled here. Conveyor at the right, transports the ore to the stockpile from the plant.

## On Mesabi Range—

# Hanna's New Hunner Iron Plant

One of the more recent additions to the concentration plants on the Mesabi Range of Minnesota is M. A. Hanna Company's new Hunner plant at Coleraine. The plant is currently processing 800 long tons of hematite-bearing iron ore per hour from the large Hunner open-pit mine.

Three separate circuits are used to beneficiate the ore, with a fourth circuit under construction and nearing completion. Utilizing a wash circuit, heavy-media circuit, and spiral circuit, the company plans to further improve the concentrate grade with the addition of a cyclone section to further process classifier rake product from the wash plant. Radio controlled

pumps in the tailings and fresh water line, as well as pumps driven through fluid couplings, indicate a trend towards automatic control in modern ore beneficiation plants.

The entire mill receives fresh water at the rate of approximately 11,000 to 12,000 gallons per minute, through a 3¼-mile-long fresh water line. Pumps in the fresh water line are radio controlled from inside the mill.

### Crushing Plant

Hematite ore from the pit is hauled to a 100-ton bin in 34-ton, end-dump trucks. The crude ore bin is located above the primary crushing and

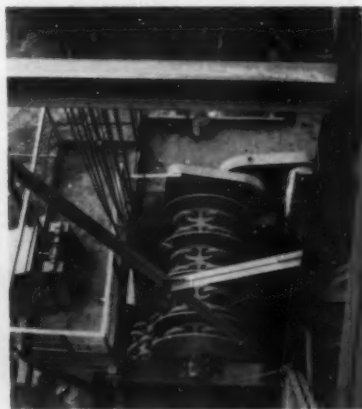
screening units. A reversible apron feeder enables the crushing plant to accommodate either waste or ore by reversing its direction of feed, thus allowing the waste to by-pass the crushing process. Waste handled in this manner is then fed by a chain feeder through a primary screen, with openings at five inches, is fed onto a 30-inch, 500-foot-long conveyor to a 400-ton surge bin. Oversized ore is crushed in a 30-inch primary jaw crusher set at five inches, at which point it is also conveyed to the surge bin. From the surge bin, the ore is fed by another apron feeder onto a 30-inch conveyor leading into the mill. A Weightometer weighs all ore entering the mill while on the conveyor.

### Merchant Ore By-passed

As ore enters the mill, it can follow either of two routes. Should a flow of high-grade or merchantable ore be entering, this ore may be diverted from the mill circuit and conveyed directly to loading bins, again being weighed enroute. All other ore at this point is conveyed to two, double-deck, primary wash screens. Impure water from the heavy media circuit is used for washing at this point, as



PRIMARY CRUSHING plant supplies Hunner plant with 800 long tons per hour of minus five-inch ore.



WASTE ROCK is loaded into trucks for transportation to dump by this large chain feeder.

the abrasive action of the solids in the wash water cleans the ore more effectively than if clean water were used.

Primary and secondary overflow from the cyclones, as well as the rougher spirals tailing, is pumped to a tailings basin via two, 3½-mile-long, tailings pipes 16 inches in diameter. Tailings first enter a surge tank connected to the long tailing pipe lines.

In order to keep the tailings tank at a constant level, a variable speed pump is connected in series with a constant speed pump. The variable speed pump features a fluid drive, which transmits smooth power from the impeller to the runner by a vortex of oil. A control system, working on a pressure differential, is used to control the variable speed pump. Two

additional booster pumps are used in the long tailing lines. The pumps in the two tailings lines are all 12-inch sand pumps remotely controlled by radio signals from inside the mill building.

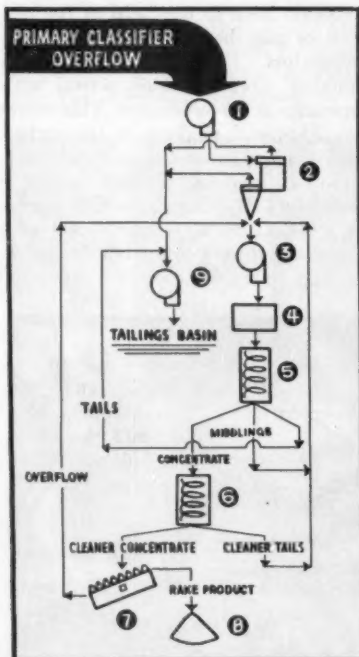
Concentrates and merchantable ore are shipped by rail to nearby Great Lakes ports. Rail facilities are located directly at the Hunner plant.

### Spiral Plant is Supplied by Primary Classifier Overflow From Wash Plant

Primary classifier overflow is pumped by means of two 10-inch sand pumps, into a bank of 10, two-stage cyclones. The cyclones produce a primary overflow, secondary overflow, and underflow. Underflow material is pumped by a 12-inch sand pump to 128 rougher spirals via four distributors. Rougher spiral concentrate is further processed in 64 addi-

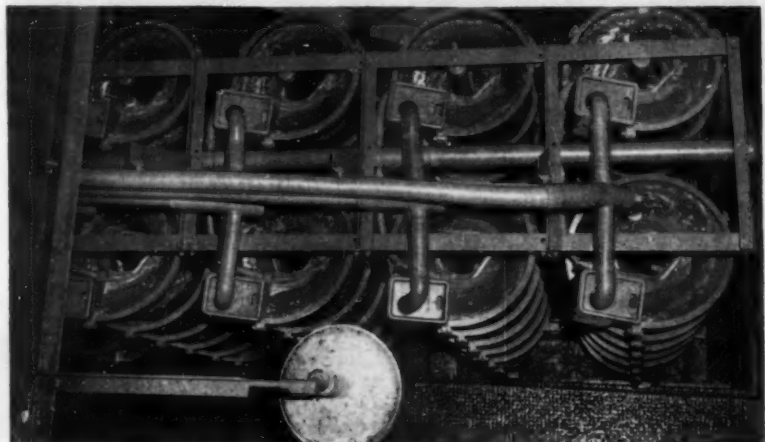
tional cleaner spirals, and the cleaner tailing, along with the rougher mid-

dling, again enter the head of the spiral circuit. The cleaner spiral concentrate is dewatered in a 78-inch dewatering classifier, and the sand product is conveyed to the concentrate stockpile, while the overflow again enters the head of the circuit.



Spiral Plant

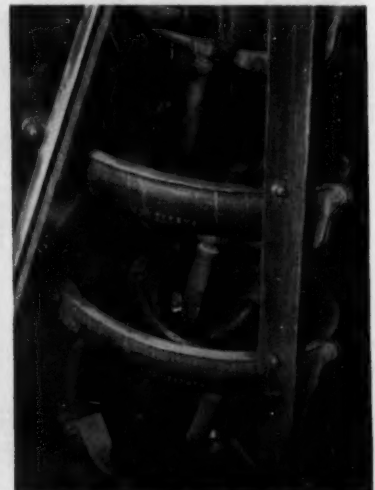
1. Two 10-inch sand pumps.
2. Three banks of five 29-B, 2 stage cyclones.
3. One 12-inch sand pump.
4. Four distributors.
5. 128 rougher spirals.
6. 64 cleaner spirals.
7. One 78-inch dewatering classifier.
8. Concentrate loading bin or stockpile.
9. Four banks of two 12-inch sand pumps in series.



LOOKING DOWN on a partial bank of spirals in the spiral section of the Hunner plant. Cyclone underflow is pumped into banks of 128 rougher spirals and 64 cleaner spirals.

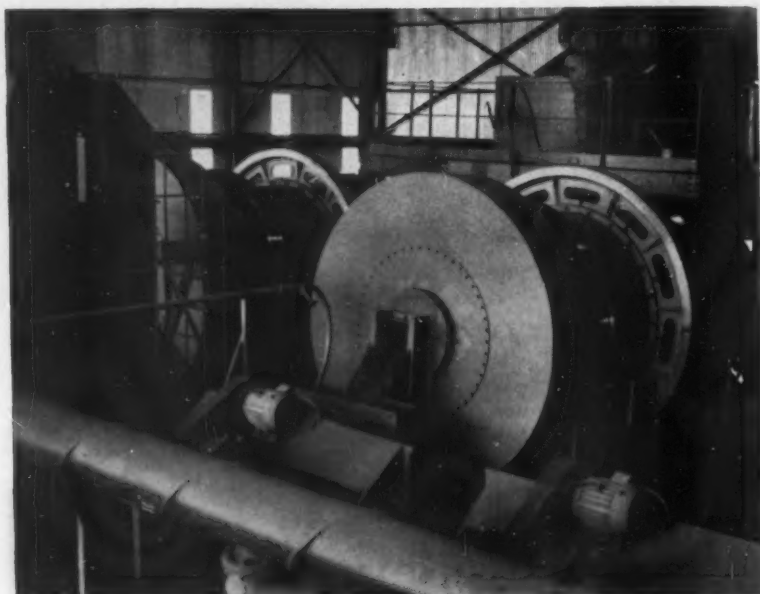


TWO-STAGE CYCLONES provide spiral plant feed. Ten cyclones are used in banks of five each; two are shown here.



SWIRLING MOTION is imparted to pulp in this spiral concentrator. Cleaner spiral concentrate is stockpiled.

## Heavy Media Separation at Hunner



DRUM SEPARATORS in the HMS section. These are 7- by 16-foot units. The 6- by 14-foot double deck preparation screens ahead of HMS may be seen in upper background.

### Heavy Media Plant Processes 500 Tons Hourly With Two Identical Circuits

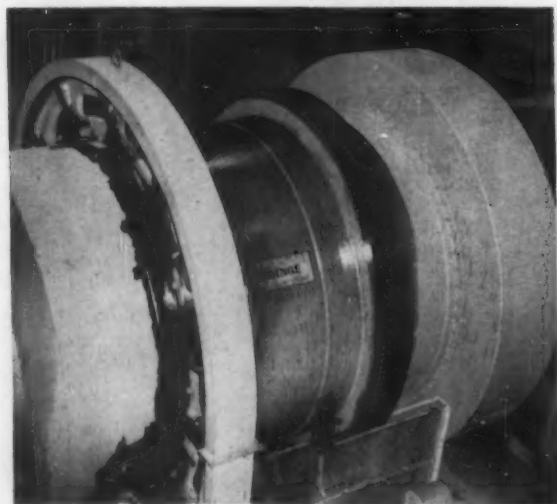
The heavy media plant is divided into two identical circuits, and processes approximately 500 tons hourly. Two different sizes of feed enter the two heavy media circuits, the reason being that optimum medium specific

gravities can be maintained in each circuit, thus producing a higher grade concentrate. Presently a specific gravity of approximately 2.85 is maintained. Should only one size feed be utilized, a higher specific gravity

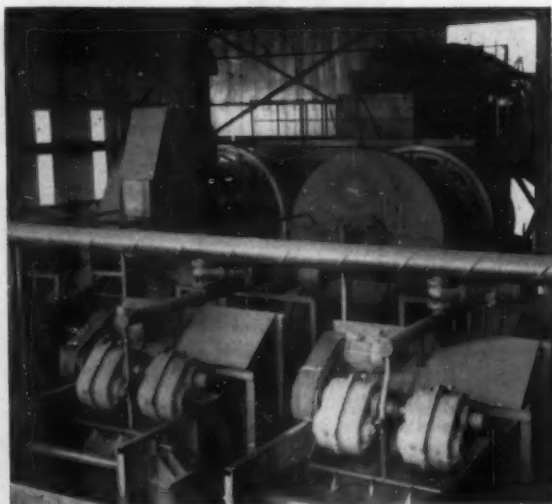
would have to be used, which might result in the loss of some fine hematite otherwise recoverable with a medium of low specific gravity.

All ore entering the heavy media section is plus- $\frac{3}{16}$ -inch material from the wash plant. It is fed onto a 6- by 14-foot double deck preparation screen with screen openings of  $\frac{3}{4}$  inches and  $\frac{3}{16}$  inches. The plus- $\frac{3}{4}$ -inch material with ferrosilicon media enters one of the 7- by 16-foot separators, while the minus- $\frac{3}{4}$ -inch, plus- $\frac{3}{16}$ -inch material enters the second separator. All resulting minus- $\frac{3}{16}$ -inch material is pumped back to the head of the mill circuit to be used as wash spray on the primary wash screens and also as a spray in the cone crusher.

The pulp level in the separators, which revolve at approximately 3 to 4½ revolutions per minute, is kept approximately at the half-way mark. The float and sink products leaving the separators are drained on two vibrating screens having openings of 2½ millimeters. At this point, splitters are used to direct the flow of the undersize medium, which either may be pumped back to the head of the circuit or may be cleaned on magnetic separators. Float oversize falls on another vibrating drain screen with openings at 2½ millimeters. This recovers additional medium in the undersize which is pumped by a 6-inch sand pump to two double-drum magnetic separators. Oversize from this screen is weighed by a Weightometer and conveyed to a loading bin for truck haulage to the course tailing stockpile.

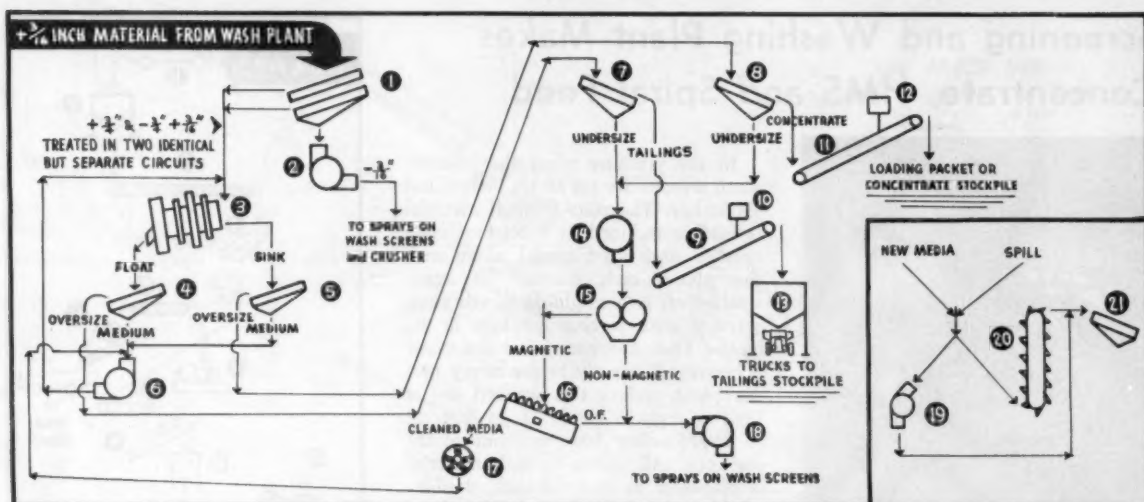


CLOSEUP VIEW of one of the two 7- by 16-foot drum separators in the HMS section of the plant. The drum rides on the two steel tires shown in the photograph.



OVERALL VIEW of the Hunner plant HMS section. Preparation screens on balcony at rear. Two drum separators in center and the product washing screens are clearly visible.

## Heavy Media Separation at Hunner



1. Six- by 14-foot double deck preparation screen.
2. Six-inch sand pump.
3. Two 7- by 16-foot separators.
4. and 5. Two 6- by 6-foot single-deck screens with 2 1/4-mm openings.
6. Six-inch sand pump.
7. and 8. Two 6- by 6-foot single-deck screens

Cleaned medium from the magnetic separators flows to a 66-inch densifier, is demagnetized by an 8-inch demagnetizing coil, and pumped back to the head of the circuit. The non-magnetic product from the magnetic drums, as well as the overflow from the densifiers, is pumped by a

### Heavy Media Plant

- with 2 1/2-mm openings.
  9. 24-inch conveyor.
  10. Weightometer.
  11. 24-inch conveyor.
  12. Weightometer.
  13. Loading bin.
  14. Two six-inch sand pumps.
  15. Four 36- by 48-inch double magnetic drums.
  16. 66-inch densifier.
  17. Eight-inch demagnetizing coil.
  18. Ten-inch sand pump.
  19. Four-inch vertical pump.
  20. Eight- by 16-inch bucket elevator.
  21. Heavy media tailing wash screens.
- 10-inch sand pump to sprays on wash screens.
- The sink product from the separator also flows on to a 6- by 6-foot vibrating drain screen, and plus-2 1/4-millimeter particles are washed on a 6- by 16-foot screen having a 2 1/2-millimeter opening. All oversize from

this screen is concentrate which is weighed by a Weightometer and conveyed to a loading pocket or concentrate stockpile. Undersize (mostly medium) is either diverted to the head of the heavy media circuit, or cleaned in the magnetic separators.



FERROSILICON RECOVERY is by magnetic separators. This is one of four 36- by 48-inch double drum units in the HMS section recovering media washed from the separator products.



FERROSILICON MEDIA is cleaned by two 66-inch densifiers. Media from HMS section is dewatered by the densifier and pumped back to the head of the circuit for reuse.

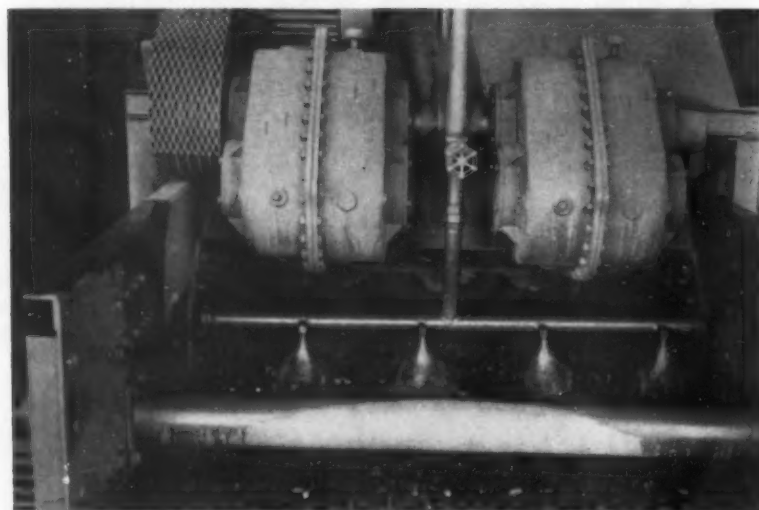
## Hunner's Wash Plant

### Screening and Washing Plant Makes Concentrate, HMS and Spiral Feed



RADIO CONTROLLED valves in the tailings line simplify tailings disposal. Shown here is the valve control panel.

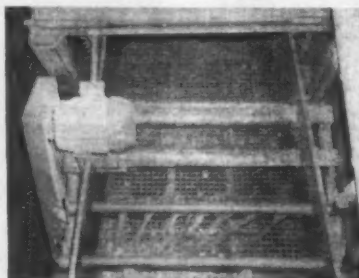
In the washing plant the primary wash screens are set at  $1\frac{1}{4}$  inches and  $\frac{3}{16}$  inches. The plus- $1\frac{1}{4}$ -inch material is further reduced in a  $5\frac{1}{2}$ -foot cone crusher, and this material, along with the plus- $\frac{3}{16}$ -inch fraction, is again washed on two single-deck, vibrating screens, with screen openings at  $\frac{3}{16}$  inches. Oversize material at this point is conveyed directly to the heavy media plant, unless this washed ore is high enough in grade to go directly to the loading bins or concentrate stockpile. All minus- $\frac{3}{16}$ -inch material is classified in two, 78-inch, double-pitch, modified flare, spiral classifiers, set at a slope of  $3\frac{3}{4}$  inches per foot. The classifier product is conveyed directly to loading bins or concentrate stockpile, while the overflow presently is being processed in the spiral plant.



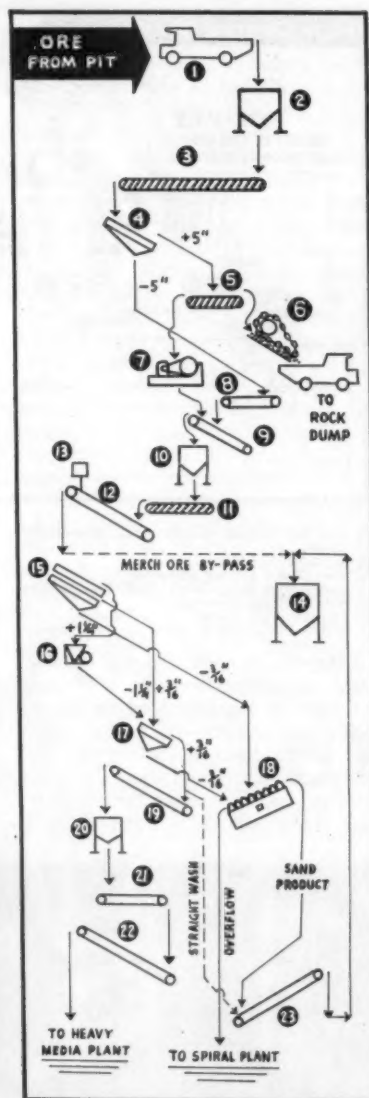
A CLOSEUP VIEW of one of the vibrating wash screens in use in the wash circuit at the Hunner plant. Most of the ore entering the plant is beneficiated in the wash circuit, as waste silica occurring with the iron ore is easily washed off.



LOOKING INTO the head of a vibrating screen at the Hunner plant. Five vibrating screens are used in wash plant.

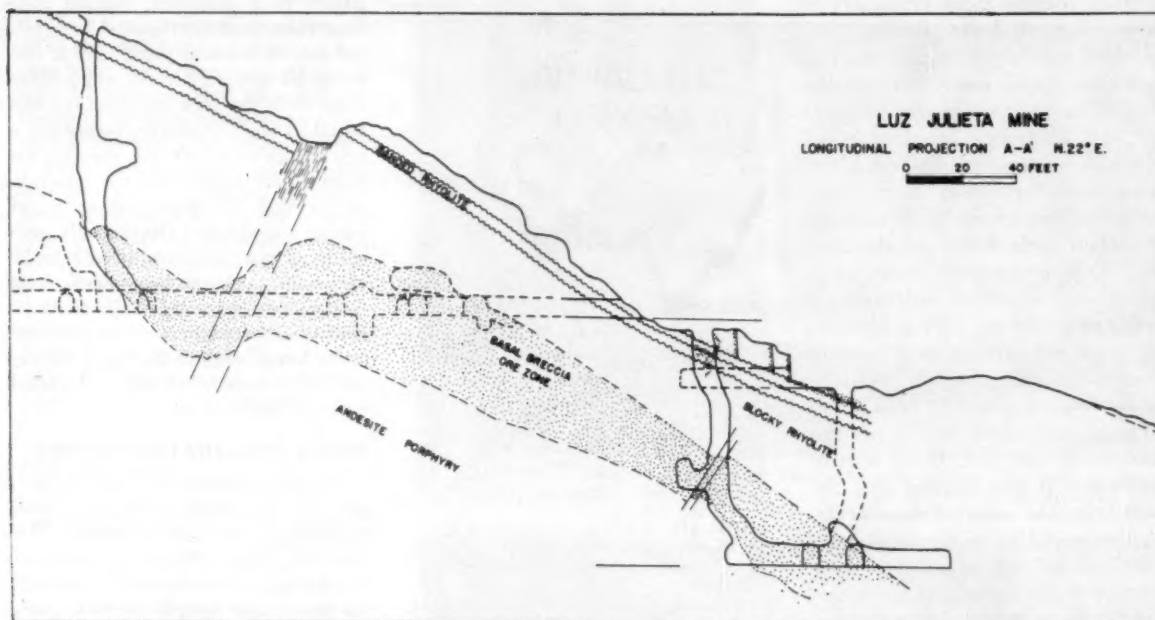


LOOKING DOWN on a vibrating wash screen. Densifier overflow is used to supply wash water.



Wash Plant

1. 34-ton end dump trucks.
2. 100-ton storage bin.
3. Five-by-16-foot apron feeder.
4. Five-by-12-foot vibrating screen.
5. Four-by-10-foot reversible apron feeder.
6. Chain feeder.
7. 30-by-42-inch jaw crusher.
8. Four-by-12-foot apron feeder.
9. 30-inch conveyor.
10. 400-ton surge bin.
11. Four-by-14-foot apron feeder.
12. 30-inch conveyor.
13. Weightometer.
14. Loading bin.
15. Five-by-14-foot, and 6-by-14-foot double deck vibrating screens.
16. 5½-foot cone crusher.
17. Six-by-16-foot, and 5-by-16-foot single deck vibrating screen.
18. Two 78-inch spiral classifiers.
19. 30-inch conveyor.
20. Bin.
21. Four-by-12-foot apron feeder.
22. 30-inch conveyor.
23. Conveyor.



CINNABAR fills fractures and open breccia to form this flat dipping ore body at the Luz Julieta mine. Ore zone follows foot-

wall contact with andesite porphyry. Occasionally cinnabar seams 2 to 10 inches thick are found.

## Old Mexico's Newest Mercury Mine Developed By Cia. Minera Peralta

A two year program of exploration by Cia. Minera Peralta, S.A. de C.V., on a relatively unexplored cinnabar

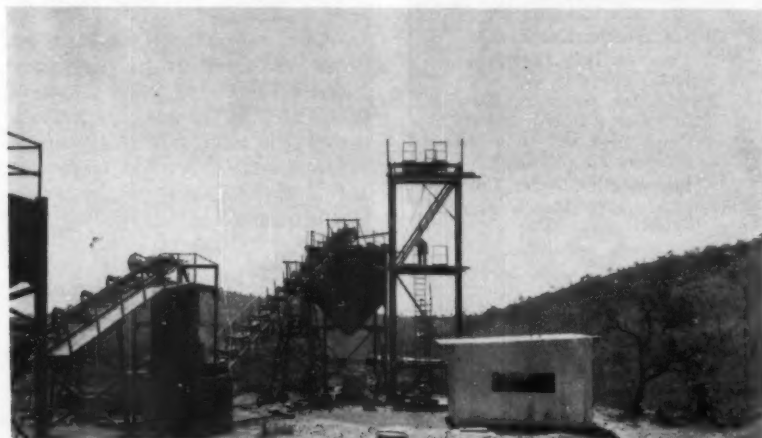
prospect has resulted in the development of a low grade deposit which may well become one of Mexico's

principal mercury producers. Culmination of this program is the installation of a 75 ton per day reduction plant which is scheduled to be on stream August 1.

The deposit is on the Luz Julieta exploitation concession near Pedernales, Municipality of Guerrero, 130 kilometers west of Chihuahua City. Cinnabar was first discovered in the area in 1932 by Albino Grijalva, Jr., one of the present owners. Small amounts of high grade cinnabar were mined from superficial workings at various intervals from 1938 to 1953. When Peralta's engineers examined the property in 1955, very little cinnabar was exposed. However, the geologic potential was considered to be exceptionally good; and a three stage program of exploration was undertaken.

### Geology and Mineralogy

Rock formations in the Pedernales region consist of a broad series of



CONSTRUCTION of the reduction plant was started in May with first ore scheduled to be furnace August 1. This photograph was taken in late June looking toward furnace site from coarse ore bin at far left.

Tertiary volcanic rocks, principally of flow origin. Andesite, rhyolite, and rhyolitic tuffs predominate. Regional uplift has caused gentle tilting of the formations, the average dip being 30 to 35° northeast. Interformational creep down-dip has resulted in intense basal brecciation of the more competent formations such as rhyolite. High angle faults are abundant and form pronounced shear zones which usually trend east-west or northeast-southwest. The principal host rock for cinnabar is a siliceous rhyolite porphyry which outcrops boldly where exposed by erosion and faulting, and which has a nominal thickness of 100 feet. At the start of exploration it was inferred that the most favorable areas for cinnabar deposition would be in the basal brecciated zones and subordinate shear zones; and this hypothesis has subsequently been remarkably well substantiated. An accompanying picture shows typical occurrence of ore in a



CHIHUAHUA will be an important Mexican mercury producer when the new plant near Pedernales starts this month.

brecciated zone along the footwall contact of rhyolite with andesite; as well as subordinate mineralization along high angle fractures and shear

planes in a shattered, banded zone near the top of the rhyolite.

Mercury is found principally as cinnabar filling open breccia, although in some cases the rock has been impregnated as well. However, except for a few instances where the rhyolite has been highly kaolinized, the mineralization due to impregnation is of minor importance. Occasionally rich seams of pure cinnabar from 2 to 10 inches in thickness are found along footwall or hanging wall contacts. Native mercury has been encountered in the lower levels of the mine. Hematite is generally closely associated with all types of ore.

### Mining Primarily Underground

Mining is principally underground, although a small area is being adapted to open pit operation. The footwall breccia zone is explored and developed with timbered inclined transverse slots spaced 50 feet apart, cutting entire ore thickness of 20 to 30 feet and having level intervals of 300 to 400 feet. Pillars between the slots are to be extracted with a re-treating horizontal cut and fill system. Ore is moved to haulage chutes with IR-two drum air-driven slushers and is hand-trammed to a surface bin for transfer to the stockpile by truck.

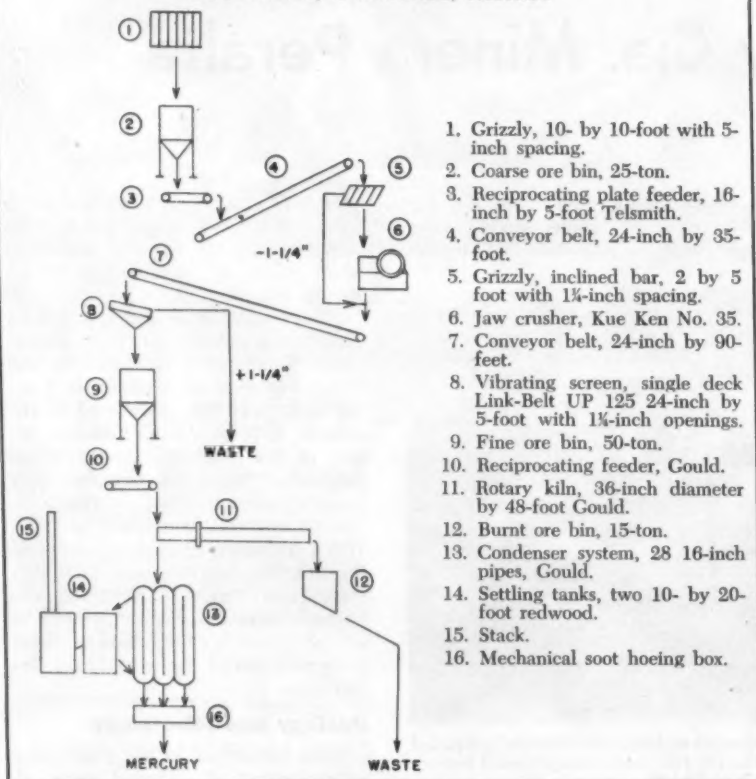
### Stockpile Advantages

An open stockpile of approximately 1,000 tons of mined ore is maintained at the reduction plant. It is intended that this stockpile will serve three purposes: 1 To ensure uninterrupted ore flow to the plant; 2. To permit time for assay control and blending to maintain uniformity of grade; and 3. To allow air slaking of mercury-bearing clay gouge in the ore before it is crushed and screened. Blended ore is fed from the stockpile by means of an Allis-Chalmers HD-6G tractor shovel with a 1 yard bucket. This unit is also used for stripping, pit loading, and general utility. Grade of furnace feed will be maintained at 5.0 pounds Hg (2.26 kilos) per ton by assay-blending control.

### Furnacing Plant

The plant is of steel construction throughout. Ore is crushed in single stage to pass 2-½ inch and then dry screened on 1-¾ inch square opening. Screen undersize passes to 50 ton storage ahead of a Gould 50 ton per day oil-fired rotary furnace and condensing system. Screen oversize is normally discarded as waste due to

### Flow Sheet Compania Minera Peralta, S.A de C.V. Mercury Reduction Plant Pedernales, Chihuahua, Mexico



the fact that crushing jars practically all of the cinnabar loose from the host rock and the values then report to screen undersize. Thus approximately one-third of total plant input is discarded as waste ahead of the furnace.

Burnt ore is discharged from the kiln into a 15 ton soaking bin before being discharged by gravity over the edge of a cliff to the waste disposal area. The crushing and screening section is designed to operate on a one shift basis, while the furnace and condenser section operates 24 hours daily. Power is supplied by two 30 kilowatt International-Ready-Power Diesel-electric generating sets.

### Management

Compañía Minera Peralta, S.A. de C.V. is domiciled in Chihuahua and has branch offices in New York, New York and Albuquerque, New Mexico. Arturo Peralta-Ramos is president and chairman of the board; Desmond H. Morris is executive vice president. Operations are under the direction of Chapman, Wood and Griswold, consulting engineers, of Albuquerque; and John A. Wood of that firm is vice-president and director general of Peralta. Lew Adamec is resident general manager. Nolen E. Neff is construction superintendent, and Fernando Grijalva of Pedernales is mine foreman.

The concession is owned by Ramón Grijalva O. and Albino Grijalva, Jr. of Chihuahua and Pedernales.

THE END



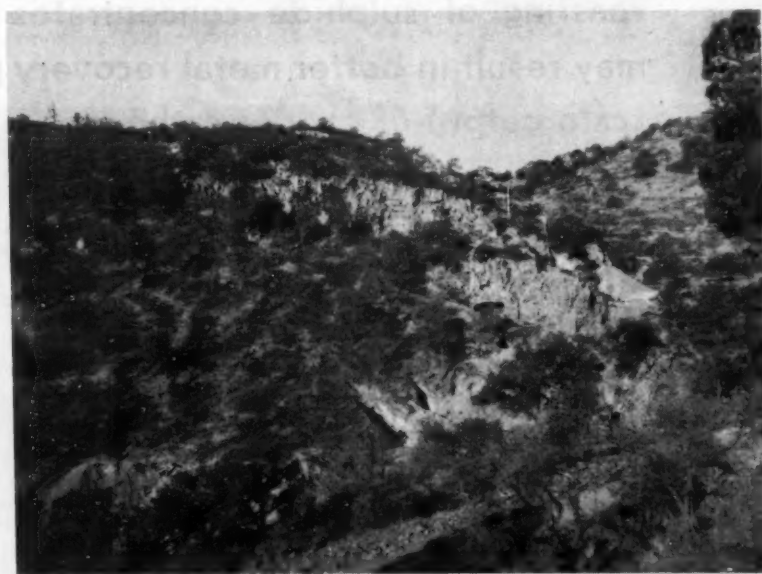
MINERA PERALTA'S president Arturo Peralta-Ramos, left, has the honor of having the company named after him. At the right is Desmond H. Morris, executive vice president of Cia. Minera Peralta, S. A. de C. V.



OPERATING STAFF, from left to right: John A. Wood, vice president and director general; E. P. Chapman, Jr., consultant; Lew Adamec, general manager; Nolen Neff, construction superintendent; and Fernando Grijalva, mine foreman.



OPEN-PIT mining will be done on this near surface ore occurrence. Cinnabar fills fractures in highly shattered area.



ORE-BEARING silicious rhyolite porphyry outcrops boldly at the Luz Julieta mercury mine. Surface and underground development blocked out a three year's reserve of ore before the decision to build reduction plant was made.



**ELECTROLYTIC CATHODES**, 99.9 percent plus copper, are the final product of Bagdad Copper Corporation's new and unique 5-ton-per-day pilot plant. E. S. Howell, plant metallurgist, is checking a stack of cathodes.

## Electrolytic Copper Production Is Goal of Bagdad Pilot Plant Study

**Some problems still to be overcome, but FluoSolids roasting of sulphide concentrates for electrolysis may result in better metal recovery plus commercial-scale output of copper cathodes**

At Bagdad, Arizona, Dorr-Oliver, Inc. and Bagdad Copper Corporation are busy developing an economical method of recovering electrolytic copper from sulphide concentrates. At a unique 5 ton-per-day pilot plant, a small portion of the sulphide concentrates produced at Bagdad's 4,000-ton flotation mill are subjected to fluidized-solids, sulphate roasting in a Dorrco FluoSolids reactor. Calcines are subsequently leached and the copper recovered from the pregnant solution by electro-winning. Normal electrolytic cathodes assaying over 99.9 percent copper have been produced.

In addition to the advantage offered by production of metallic copper, the

pilot study might ultimately lead to a 50 percent greater copper extraction at Bagdad. The latter possibility exists because by-product sulphuric acid is generated in the electrolytic process, and is available for heap leaching of sub-grade copper oxide capping.

Recent advances in roasting techniques have made the process currently under study appear feasible. Close temperature and air control offered by the FluoSolids reactor permits selective sulphatizing of the copper in the concentrate. Over 90 percent of the copper in the feed can be rendered water-soluble. The remainder is soluble in a weakly acidified

solution. Iron, the predominant impurity in the concentrate, is oxidized to an insoluble ferric oxide. Thus the FluoSolids reactor yields a very pure circuit for solution electrolysis and recovery of copper.

To date, commercial application of this technique has been limited. Dowa Mining Company in Japan has successfully operated a sulphate-roasting and electrowinning plant on a commercial scale since 1953. Several firms are actively investigating the possibility. And Union Minière du Haut-Katanga has a similar plant scheduled for completion in 1959 (See MINING WORLD, February 1957, page 62). Due to Bagdad's relatively remote lo-

cation and ore occurrence, sulphatizing copper concentrate for electrolysis holds a great deal of promise. The true importance of the study is not apparent until one understands something of the conditions at Bagdad.

### Greater Copper Extraction

The porphyry ore deposit occurs in quartz monzonite which is overlain by up to 200 feet of barren Gila Conglomerate. The mineralized formation is approximately 350 feet thick, but the upper half has been leached and oxidized; typical oxidation products, such as chrysocolla and copper carbonates, are found in this leached capping. In the underlying sulphide zone, copper occurs mainly as chalcocite with smaller amounts of chalcopryrite. The grade of the sulphide ore, which is mined from an open pit, is approximately 0.8 percent copper; however, the overlying oxidized zone contains only about 0.45 percent copper, and is not rich enough to sustain conventional treatment methods. But since this portion must be moved to recover the underlying sulphides at Bagdad's open pit, it stands to reason that if a source of low cost acid were available, the material could be profitably treated by heap leaching and cementation. Through the years Bagdad has segregated this oxide capping in a separate dump in anticipation of eventual leaching. An acid solution is required for this dump since the iron content is quite low.

Over 14,000,000 tons of the sub-grade oxide ore have been placed in the dump. Of the rock in place and yet to be mined, the tonnage of oxide capping is nearly equal to the tonnage of the higher grade sulphide ore now

treated by flotation. Acid generated in an electrolytic plant could be used to increase the total recovery of copper from the deposit.

### Shipping and Price Advantage

Bagdad's location is also a factor in considering the production of electrolytic copper. Currently, sulphide concentrate output amounts to about 80 tons per day. This product must be trucked 25 miles to a railroad siding at Hillside, Arizona, and then shipped by rail to a smelter at El Paso, Texas, over 400 miles away. Obviously several advantages seem apparent in the production of 99.9 percent copper since this product represents only about 25 percent of the concentrate by weight. There would be a net saving in the quantity of material hauled between Bagdad and Hillside. The smelter treatment charge would be eliminated. The saving in rail shipment expense between Hillside and El Paso would have to be balanced against a probable higher cost in shipping copper to eastern fabricators. (If outlets could be developed on the west coast, much of this disadvantage would disappear.)

One other factor enters the picture. Bagdad would receive a price advantage based on the sale of electrolytic copper rather than on the sale of copper contained in concentrate. The company is pointing for eventual expansion to 10,000 tons of ore per day. The net effect of the above advantages applied to a daily tonnage 2½ times greater than now prevails materially increases the savings potential. Certainly a close study of commercial roasting and electrolytic facilities is

justified. The jointly created pilot plant is providing the answers regarding operational technique and process control.

### Basic Chemistry

The primary object of the roasting process is (1) to produce the maximum amount of water-soluble copper sulphate with minimum production of copper oxides; and (2) maximum oxidation of the iron sulphide content of the concentrate to ferric oxide which is insoluble in both water and weak acid. Selective sulphating of copper is theoretically possible due to the higher heat of formation of ferric oxide compared to copper oxides. It is a basic rule of chemistry that of two possible reactions the one with the greatest heat of formation is favored. When roasting a mixture of copper and iron sulphides, decomposition of ferrous and ferric sulphate takes place at a lower temperature and the tendency is to yield the sulphate radical to copper.

In actual practice, precise control of roasting conditions is required to meet the above requirements. Fluidized roasting in the Dorco FluoSolids appears to have met this need at the Bagdad pilot plant.

The plant was designed to treat 5 tons of copper concentrates per day. The concentrate is delivered by truck to the pilot plant where it is weighed and repulped to approximately 24 percent moisture. Normal concentrate analysis will show about 27 to 28 percent copper, 16 to 18 percent iron, and 27 percent sulphur. The feed is pulped in batches. The actual rate of feed to the 5-foot-diameter FluoSolid



TANK HOUSE INTERIOR with electrolytic cells of stripping section in foreground. Behind these are cells making up commercial section of tank house. Right background is assay laboratory.



FLUOSOLIDS CONTROL PANEL contains the measuring and recording gauges and charts for temperatures, air, and water for both the reactor and the dust recovery system.



PILOT PLANT in foreground and part of open-pit mine in background with a portion of tank house on left. Dorco FluoSolids reactor shows at far right behind the Peabody scrubber.

reactor is varied according to the copper content of the concentrate. A constant feed rate in pounds of concentrate per minute may also be utilized but often results in a complete change of tankhouse flows to compensate for the varying copper value of the reactor feed material plus changes in the acid consuming quality of the calcine. Two slurry mixers are used in pulping the concentrate. One brings the feed to the proper density and the other serves as a reservoir for the pump on the reactor feed gun. Flow between the two units is by gravity.

### Roasting

The gun feeding the reactor is mounted at the top of the roaster. It is made of 316 stainless steel and consists of an inner barrel of  $\frac{3}{4}$ -inch pipe surrounded by a 1 $\frac{1}{2}$ -inch pipe serving as a jacket. The reactor feed pump is an improvised unit containing a diaphragm taken from the hydraulic brake of the front wheel of a truck. It is driven by a variable speed motor and the length of the pump stroke is adjustable. Top feeding of the pilot plant reactor rather than side feeding at the bed level has eliminated the formation of agglomerations on the end of the feed gun.

Sulphur in the ore serves as the fuel and no external heating is necessary following the initial start-up pe-

riod. Control of roasting conditions is maintained by varying feed rates, volume of air admitted to the fluidized bed, and controlling cooling water. Adjustment of the pulped concentrate introduced to the reactor regulates the amount of fuel and also the amount of water serving as a coolant.

### Control

Temperature taps coupled to recorders are installed in the fluidized bed, the freeboard of the reactor, and in the associated cyclone and scrubber system which recovers solids from the exit gas of the roaster. One of the temperature taps in the fluidized bed is set to operate automatically. In addition a high and low temperature alarm with a 65° F. differential is connected with one of the bed temperature recorders. Other reactor controls include an air-volume recorder, a recorder for registering the volume of coolant, and five sets of pressure taps—reactor windbox, reactor bed, reactor freeboard, cyclone and scrubber.

The FluoSolids reactor is operated with a bed depth of 70 inches normally. The bed temperature varies from 1270 to 1280° F.; residence time is 3½ to 5 hours. Calcine from the reactor drops through an air lock at the bottom to a quench tank containing a stainless steel agitator. Pregnant so-

lution is actually produced at the quench tank since it is fed with spent electrolyte from the tank house as well as wash water advance from a series of counter current thickeners which wash sands thickened from the pregnant solution. The calcine from the roaster carries about 2 pounds of copper per pound of sulphur contained in the sulphate radical.

The pregnant slurry from the quench tank is thickened and solids are removed from the thickener overflow by passing it through one of a series of four sand filters. The clear-pregnant solution then advances to a holding tank feeding the electrolytic tank house. The thickened underflow contains appreciable quantities of pregnant solution plus some undissolved copper oxide. This product is leached in a Paralene-lined agitator and the solids are washed in a series of three, 5-foot-diameter, lead-lined Dorrr thickeners. The sands advance to tailing and first thickener overflow returns first to the dust recovery circuit of the FluoSolids system and then back to the calcine quench tank.

Approximately 24 percent of the reactor feed is carried out with the exit gas from the roaster. However, this material is recovered in a Ducon cyclone and Peabody scrubber operating in series. Reclaimed solids re-enter the leach circuit; and the gas is then vented to the atmosphere. The dust recovery system, specifically the Peabody scrubber, utilizes the wash water advance from the CCD thickeners to strip solids from the gas. This wash water is eventually returned to the calcine quench tank.

Electro-winning copper from the pregnant solution fed to the tank house generates sulphuric acid. A portion of this material is available to serve the acid requirements of the calcine leaching circuit. About half the spent electrolyte from the tank house is in excess of make-up acid requirements and is available for leaching oxide dumps following removal of all but a minor quantity of copper.

### Tank House

The tank house consists of three sections. In the first, two cells are employed for making starter cathodes for use in the commercial section of the tank house. The commercial section contains 16 cells where high purity electrolytic copper cathodes are produced. The final stripping section consists of a series of 4 stripping cells which

precipitate the remaining copper from the excess spent electrolyte from the commercial section.

Starter sheets are plated out on pure cold rolled  $\frac{1}{8}$ -inch-thick copper blanks using plant solution. The starter cells each measure 12 feet long by 3 feet 2 inches wide (i. d.) with a solution depth of 3 feet 8 $\frac{1}{2}$  inches. At the present time a 24-hour starter sheet is made (less the time required for stripping starter sheets from the blanks). The blanks are grooved on all sides and masked with tape at the solution level to prevent corrosion. Scotch-rap, a product of Minnesota Mining and Milling Company, is used for this latter purpose.

The 6-pound cathode starters stripped from the blanks are trimmed and punched. Two loops are attached to the starter sheet so that it can be hung in a cell in the commercial section. Each cell in the starter section is capable of producing 54 starter sheets per day.

The commercial section consists of 16 concrete cells which are lead lined and arranged in 4 banks of 4 cells. Each bank contains its own airlift pump for solution circulation. A series-parallel electrical arrangement is used with provision being made to short circuit across any desired cell. The cells measure 11 feet 4 inches in length by 2 feet 10 inches wide. Depth is 3 feet 4 $\frac{1}{2}$  inches to the solution line. The incoming pregnant solution contains 50 grams per liter of copper and is heated to 35 to 40° C. Pregnant solution is heated by heat exchanger submerged in the scrubber circuit and a similar unit in the pregnant heating tank through which wa-

ter is circulated by a small circulating pump. Antimonial lead anodes in the commercial section are on a 4-inch spacing with about 13 to 15 cathodes per cell. At the present time an 8-day cathode is made which weighs approximately 90 pounds. The cathodes are bundled in 1,800 to 2,000-pound bundles for shipment.

#### Acid for Dumps

Electrolysis of the incoming pregnant plant solution generates sulphuric acid and about 50 percent of the spent electrolyte from the commercial section is returned to the leaching circuit. The remainder of the electrolyte from the commercial section is in excess of plant requirements. This solution is bled-off into the stripping section of the tank house for removal of approximately 25 grams per liter of

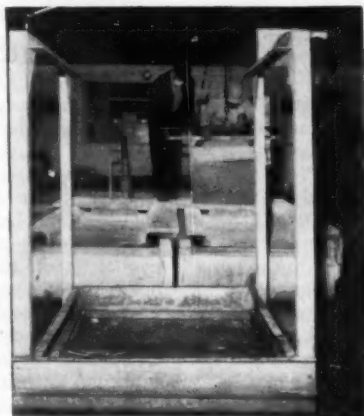
copper in the spent solution. The exit solution from the stripper cells contains 0.1 to 0.15 grams per liter of copper and approximately 12 percent sulphuric acid.

The four cells in the stripping section measure 11 feet 4 inches long by 2 feet 10 inches wide. Depth to the solution level is an even 4 feet. Due to the low copper content of the electrolyte entering the stripper section, the copper precipitates from the electrolyte on the cathode as a sponge. The stripper cathodes, however, are cleaned periodically, and the sponge can be returned to the FluoSolids reactor to make cathode copper by conversion of the sponge to CuO or to a combination of CuO and CuSO<sub>4</sub> if sufficient sulphur is available in the concentrate feed. All sponge converted to CuSO<sub>4</sub> represents potential sulphuric acid for leaching operations of the oxide ore dumps.

Discard from the stripper section, containing roughly 12 percent H<sub>2</sub>SO<sub>4</sub>, is diluted before spraying on the oxide dump. A small test cementation launder system has been placed in service below the oxide dump to recover copper leached from the dump. Approximately 3 gallons per minute of discard electrolyte is available for dilution and spraying on oxide dumps.

Operation of the pilot plant to date has provided a great deal of information on process details. Exceptionally high grade cathodes have been produced. If sufficient water and power can be obtained economically, the process holds a great deal of promise for Bagdad.

THE END.



PULLING starter cathodes from electrolytic cells in the starter section. Starter sheets are plated out on pure, cold-rolled,  $\frac{1}{8}$ -inch-thick blanks using plant solution.



STARTER CELLS, 12 feet long and 3 feet 2 inches wide, have a solution depth of 3 feet 8 $\frac{1}{2}$  inches. At the present time 24-hour starter sheets are plated out on copper blanks.



STRIPPING starter cathodes from blanks. Note how the blanks are grooved along sides. At the right is an electrolytic cell in the starter cathode section.

# Can Minerals Program Aid Mining And Will It Become Law This Year?

**MINING WORLD** asked industry leaders and members of Congress for their comments on the Administration's "Long Range Minerals Program" detailed in the July issue . . . here are their answers.

## Plan OK As Far As It Goes Say Industry Leaders

Here's what an Oregon miner thinks of the plan. "It is my opinion that the Long-Range Minerals Program is not long range in any manner of interpretation and it is doubtful that it is even a minerals program."

A Nevada base metal miner comments strongly as follows, "The recommendations with reference to the U. S. Bureau of Mines, United States Geological Survey etc. are nothing new: We, in the industry, appreciate the work both of these government agencies have done and are doing, but, without an adequate price for metals and minerals after they have been discovered, even with government assistance, I fail to see how we will be greatly benefited."

Idaho mining has a strong champion in HARRY W. MARSH, secretary, Idaho Mining Association, who says, "So far as the State of Idaho goes in its mineral possibilities, the Long-Range Mineral Program does not go far enough but we hope it can be amended from time to time to take care of some increase in production from the non-ferrous metals, rare earths, and industrial minerals. We will hope for prompt action on this before all of our mines have to close. Only about 25 percent of the lead-zinc mines of the state are operating at this time. We will hope that your publication will serve to expedite action in this session of Congress."

A careful analysis of the entire Program was made by CHARLES F. WILLIS, secretary, Arizona Small Mine Operators Association, for the field engineers of the Arizona Department of Mineral Resources. Highlights of this analysis are,

"Many times in this three-year period, administration officials, and particularly Interior Secretary Seaton, have

promised an early revealing of their recommendations for a long-range domestic mineral policy. It was not until May 1957 that the egg upon which they had been sitting hatched and brought forth what Secretary Seaton terms as a long-range domestic mineral policy. It was a sickly chick that was hatched. It covered but six of the scores of strategic metals and the only recommendation that would seem to fit into the picture of being a long-range domestic mineral policy was that which applied to lead and zinc.

"If the proposals made by Interior Secretary Seaton are what government officials deem to be a long-range domestic mineral program, then their understanding of what constitutes such a program is remote from that which the mining industry has expected. The domestic mining industry had been interpreting the promised program as one which would be of sufficiently long duration, with reasonable precautions against substantial changes, and which would encourage, on the basis of the promises made by legislation or otherwise, the investment of capital for the extraction of domestic metals with some degree of assurance that, after the capital investment had been made, changes in the program would not be made which would nullify the expenditures."

ROBERT S. PALMER, executive director, Colorado Mining Association, an experienced observer of the Washington, D. C. legislative scene, is optimistic about the Program as he reports, "The Long-Range Minerals Program is a step in the right direction and it is my opinion that the program can be approved by the Congress of the United States in this session of Congress unless some deeply-seated opposition sponsored by the State Department shows its ugly head."

## Can Plan Pass Congress This Session?

On June 4, hearings on the Long-Range Minerals Program were held by the Senate Committee on Interior and Insular Affairs. Senator JAMES MURRAY, Montana, Committee Chairman, in opening the hearing said, "Never in my life have I read a document (Minerals Program) so misnamed. The words 'long range minerals' should either

have been left out or the words 'designed specifically for lead and zinc' should have been added.

"All of us realize that lead and zinc mining is in trouble, and we are ready and anxious to do something toward solving that trouble. None of us are indifferent to that problem. But lead and zinc mining is only one segment

## Minerals Program — An Aid to Mining?

of the Nation's total mining economy; to single it out, as has been done, when other segments of the mining economy are in equal or greater distress is, a singular approach to developing an overall long-range minerals program.

"The Program probably will face a stiff fight in Congress but we should win."

A pessimistic outlook for legislative action is evidenced by Idaho's senior Senator, HENRY DWORSHAK, as he writes, "The Program submitted by Secretary Seaton unfortunately was delayed until the time element makes it unlikely immediate action will be taken this session. I believe the Program is a recognition that something must be done to assist the domestic mining industry to counteract the excessive imports of low cost minerals produced abroad.

"Recent price reductions, especially for lead and zinc, emphasize the need of action. I am confident that the Interior Committees of both Senate and House will give consideration to Secretary Seaton's program, but there is the possibility that if other minerals are added to the Program for lead and zinc it may be difficult to get Congressional approval."

Nevada's Senator ALAN BIBLE will introduce amendments to the proposed Program, he reports to MINING WORLD, "I think the so-called Long-Range Minerals Program as presented to the Senate Interior Committee, of which I am a member, is entirely inadequate to cure the ills that have confronted the domestic mining industry for the past several years. I do feel, however, that the suggested excise tax procedure on foreign-produced lead and zinc will undoubtedly benefit those industries to a great degree and further, and more important, is a break through in the barrier set up by the executive branch of our government against the use of tariff measures of any type to protect or help our domestic mining industry.

"It is my feeling that Congress will take measures to correct the inadequacies of the proposed bills by amending them in such a manner that other vital segments of the mining industry will also be protected from foreign producers. I strongly feel that the Department of Interior's recommendation that such vital minerals as tungsten, fluor-spar, and asbestos depend solely upon Public Law 733 for assistance is entirely wrong in its approach, and I, as a

member of the Senate Interior Committee, that will review the proposed legislation, intend to introduce amendments that will offer some dependable and immediate form of aid to rectify the breach of faith by Congress in failing to appropriate the necessary monies to carry out the intent of PL 733."

Congressional passage of parts of the Program with Secretary Seaton's support is foreseen by Colorado's senior Senator, GORDON ALLOTT, who explains, "The Long-Range Minerals Program recently announced by Secretary Seaton is, of course, something less than I would like to see. It does not cover all the minerals that are in need of assistance nor does it offer as much support as would appear to be necessary for some of the minerals mentioned.

"On the other hand, I am pleased that this much progress has been made. It strikes me as most significant that Secretary Seaton has been able to secure the approval of the Treasury, State, and Defense Departments for any import excise tax provisions.

"I was pleased to co-sponsor these bills and will continue to work with the other interested Senators in development of a sound, meaningful and truly long range program for our miners. With Secretary Seaton's tremendously valuable support, I believe Congress can and will enact at least substantial parts of such a minerals program during this Congress."

The proposed tariffs on lead and zinc are considered as a revenue measure under the rules of Congress and so the first legislative step is to secure House Ways and Means Committee approval.

Chairman JERE COOPER reported as follows in regard to the legislation of July 6th. "No action scheduled on lead and zinc legislation as of this time. Just prior to Easter recess Committee agreed to agenda which now appears will not be completed until first of August. No administration recommendation has been received on this subject when agenda was agreed to. Beginning July 9th Committee will consider miscellaneous bills of members. Possible that a member of Committee may bring this legislation up for consideration. However, because legislation is controversial it would appear necessary for public hearings to be held before taking action. Since session near to end seems unlikely there would be time to complete public hearings and take final action."

## Lead - Zinc Section Naturally Draws Most Comment

Here are a few notes written by W. H. H. CRANMER, president, New Park Mining Company, "The long range minerals policy is a step in the right direction—Half a loaf is better than none. It presents an entering wedge for relief of all raw materials producers. The basic trouble has been to breach the solid front of opposition of manufacturers seeking low cost raw materials while placing dollars in the hands of foreign consumers of their manufactured goods, and the strange desire of the State Department to give away our domestic markets to competing nations having low labor costs."

And these comments came from a Nevada lead miner, "As to lead and zinc—The sliding scale import excise tax would help and, in my opinion, it is much better than the so-called barter program. However, the program provides, "If the average 3-months' price for lead . . . etc. . . .", and

for zinc, "If the average 3-months' price for zinc . . . etc. . . .". I can see a grave danger in that "average 3-months' price" provision. In three months, the country could be flooded with lead and zinc at very low prices, inventories could be built up, all needs taken care of, the excise tax would go on, but when it was on, there would be no imports. Then, during the next 3-month period, imports would start, inventories would be built up, and, while the price would increase somewhat during this second 3-month period, it would again drop before the 3-month period expired and we would be in the same position as before."

Another Nevada zinc miner reports on the Program, "Apparently it was principally for the lead-zinc producers. It does one thing, though, and that is, it gets one foot in the door regarding tariffs. It may start getting the tariff making back where it belongs—in Congress and the Tariff

## Minerals Program — An Aid to Mining?

Commission. With Senator George W. Malone's constant reiteration about flexible tariffs it may be the first onslaught on GATT."

Views of Colorado's miners on lead-zinc were expressed by **ROBERT S. PALMER**, executive secretary, Colorado Mining Association, when he said, "The program does not fit the needs of Colorado's mining operations but is a step in the right direction. A period of adjustment of the import tax is too long and would permit flooding of the market by importers."

"It is suggested here that the proposed tax be increased 6 cents on both metals and that even though the price of zinc or lead reaches the cost of American production, that the import duty not be released. However, it is the policy of the Colorado Mining Association to support the emergency lead-zinc committee in its efforts in Washington to cooperate with the Administration in the passage of legislation during this session."

**OTTO HERRES**, National Lead Zinc Committee, who has worked continuously in behalf of producers, speaks for the western miners as he says, "More than four years of persistent effort on the part of western mining districts and their friends in Congress has paid off in acceptance by the administration of the principle of protection for

United States lead-zinc mines from destruction by a flood of imports."

"After temporizing with expedients rather than face the realities pointed out by the Tariff Commission in 1954, following an investigation and a hearing of the industry's case, the administration's tariff proposals for lead and zinc mark a return to fundamentals."

Writing as a lead-zinc producer, **CLARK L. WILSON**, vice president of New Park Mining Company, has this to report, "We feel that the lead-zinc portion of the long-range minerals program is a moral victory, but economically will not mean much to us as originally proposed by Secretary Seaton. Our strategy has been to go along with the Administration in the introduction of their Bill to the House Ways and Means Committee. We trust there will be a hearing and at that time we hope to have as many representatives as possible from western lead-zinc producers present their case to the committee and show that under lead-zinc prices of last year many of us actually lost money. It is, therefore, quite apparent that we need at least 30¢ a pound combined, and probably a couple of cents in addition to insure profitable operation, together with the exploration needed to insure a healthy domestic lead-zinc industry".

## Action Sought by Emergency Lead-Zinc Committee

An Emergency Lead-Zinc Committee was established in early June by domestic producers to do everything possible to assure passage of one of the lead and zinc tariff proposals of the Long-Range Minerals Program.

This Emergency Committee supplants the National Lead Zinc Committee which has done so much for the industry in the last several years under the chairmanship of Otto Herres of Salt Lake City, Utah. C. J. Parkinson, attorney for the Anaconda Company, is chairman of the

new committee. Executive committee members are Andrew Fletcher, president, St. Joseph Lead Company; Howard I. Young, president, American Zinc, Lead and Smelting Company; F. S. Mulock, president, United States Smelting Refining and Mining Company; Robert Kenly, vice president, New Jersey Zinc Company; and John Bradley, president, Bunker Hill Company.

Charles A. Schawb, manager of Bunker Hill Company's industrial relations department, moved to Washington, D. C. in June to head the committee's office there.

## And Nothing New Offered For Manganese

American Manganese Producers Association's president, **J. CARSON ADKERSON**, writes from Washington, D. C. that, "The recently announced Long-Range Minerals Program offers nothing new for manganese beyond what we now

have.

"To properly plan developments and make investments, domestic manganese producers should have a long-range program including a 7- to 10-year market ahead."

## No Long-Range Policy Was Suggested for Mercury

Mercury spokesman **S. H. WILLISTON**, vice president, Cordero Mining Company, said this about mercury, "Insofar as mercury is concerned, no long-range policy was suggested and, apparently, no long-range policy will be suggested. At the present time the industry has a future of 18 months. It is doubtful if more than 30 percent of the

current United States production could survive at the \$225 floor, should price of mercury drop to that level within the 18 months. No domestic producer can meet the costs of the European producers with the present tariff, equivalent to less than 8 percent ad valorem".

## **Chrome Program Would Put Producers Out of Business**

An Oregon chrome miner analyzes the Program for his mine as follows, "Concerning chromite, the price established by the government purchase program in 1953 was thought by many to be most generous. It was soon found out by these optimistic individuals that the price was just about what a good miner with a good deposit needed to stay in business. Since 1953, costs of chrome mining have

risen 40 percent. The few remaining chrome miners are barely hanging on. The proposed Long-Range Minerals Program would result in a 30 percent cut in what they are presently receiving. The actual effect of this so-called program would be to put them all out of business. The proposed Long-Range Minerals Policy in its present form offers the chrome miner absolutely nothing".

## **What Lead-Zinc Miners Can Learn From Copper Excise Tax**

CHARLES F. WILLIS indicates the problems faced by lead-zinc producers under the proposed tariff peril points as he illustrates what the experience of copper producers has been under the copper excise tax by writing "Copper, at one time, had a tariff of four cents per pound on the foreign product. In 1951 Congress enacted legislation which made the tariff apply only when the price was 24 cents per pound or below. This was done for varying short periods except for the present situation where Congress used a three-year period of tariff suspension. In 1949

GATT reduced the tariffs from four cents per pound to two cents per pound and later to 1.7 cents per pound. At no time since the peril point principle was adopted has either the peril point, or the tariffs which would be imposed, been reviewed by Congress. Economic conditions as of the present time would show that, if the peril point of 24 cents was the correct figure in 1951, the cost situation of today would require a peril point of 32 cents per pound in order to be on an equivalent basis".

## **What About Tungsten Now That Law 733 Has No Money?**

Tungsten producers are caught short because the Program backs Law 733 yet Congress has adamantly refused to authorize funds to carry out the law. W. LUNSFORD LONG, president, The Tungsten Institute, brings this out clearly as he points out, "The Program recommends the implementation of Public Law 733 by appropriations and the continuation of the price support program through

1958. . . . In 1958 the matter with respect to tungsten will be reconsidered and whatever proper action is revealed to be necessary for the future will then be recommended. . . . The industry would much prefer to see some permanent policy adopted by the government. . . . An adequate protective tariff would give the industry a definite sense of security and enable it to plan for the future".

## **Foreigners Make Plans To Curb Program from the Top**

Foreign governments, mine operators, and associations lost little time in attacking the lead-zinc section of the Program. The Bolivian Minister of Mines reports that approximately 750 mines will be closed there and that the Bolivian Economic Stabilization Plan would lose \$12,000,000 from foreign exchange.

The Peruvian National Mining Society believes the Program would "ruin" the Peruvian lead and zinc industry with loss of \$20,000,000 to the economy.

The strongest opposition to the Program has come from Mexico. Latin American nations are joining Mexico in forming a unified front.

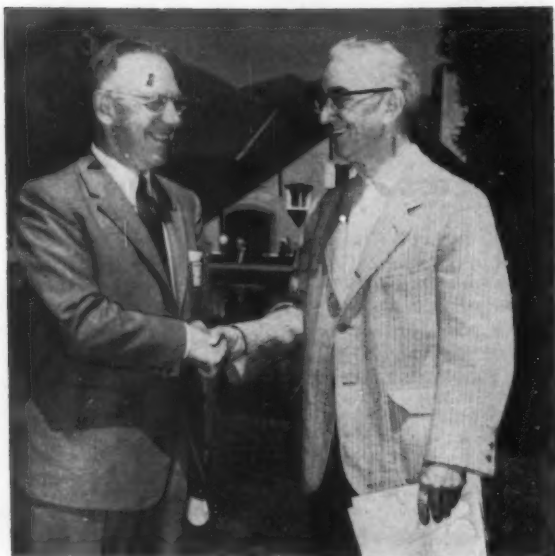
Highlights of activities south of the border are reproduced from a special MINING WORLD correspondent's report.

After a series of emergency meetings, the Mexican Small Miners Association, whose members nearly all lack the capital to carry them through a prolonged crisis, sent a representative to Washington, D. C. to advise Mexican

Ambassador Manuel Tello of their reaction, which has not been made public.

President Adolfo Ruiz Cortines' opening move was to order Ambassador Tello, a clever diplomat credited with helping to influence President Eisenhower's 1953 veto of the Simpson Bill, to sound out the opinions of United States legislators and State Department officials and to explain to them why a new attempt to elevate zinc and lead duties would harm not only Mexico and other friendly countries but also the United States.

Tello soon was back in Mexico with a bundle of first-hand reports—most of whose contents have not been revealed. But it is regarded as significant that one of the persons he was unofficially reported to have contacted was Milton Eisenhower, brother of the President, who is considered one of Latin America's "best friends" in Washington. Publicly, Tello said he spent a large part of his time pointing out Mexico is the United States' third leading customer and "if you don't buy from us, we can hardly continue to be a good client".



RETIRING PRESIDENT WELCOMES NEW PRESIDENT as LeRoy Traeger (left) hands over the papers to Wallace Woolfe.



BUTTE DEVELOPMENTS were reported by M. K. Hannifan, assistant general superintendent, Anaconda Company, second from right.

## Idaho Mining Men Urge Solid Support For Proposed Base Metal Legislation

Mining men meeting at Sun Valley, Idaho, July 14, 15, and 16 for the Idaho Mining Association's convention were in a thoughtful mood over current non-ferrous metal prices. But in Sun Valley's beautiful setting they had a chance to hear a program spearheaded by development of atomic energy for peace and progress, down-the-hole drilling, mine public relations, recovery of heavy minerals from Idaho's placer deposits, and state taxes.

They also had a chance to relax and realign thoughts on the current problems facing the industry. Uppermost in the minds of many was the burning question—what can be done to aid mining? No one knows the entire answer. But the general consensus of many was that everyone should get behind the Long Range Minerals Program to support its passage through Congress, even though many were quick to say that the present program doesn't go far enough.

### Educate Eastern Governors

The meeting was opened by Harry W. Marsh, secretary of the Idaho

Mining Association, who turned over the proceedings to the association president LeRoy E. Traeger. Mr. Traeger in his opening remarks appealed to delegates to support activities in behalf of counteracting competition from foreign mineral producers.

Featured speaker at the opening session presided over by Mr. Traeger was the Honorable Robert E. Smylie, Governor of the state of Idaho. Governor Smylie in his address emphasized the very great importance of the mining industry to the economy of Idaho. It was his observation following his attendance at the recent governors meeting in Williamsburg, Virginia, that the mining industry must undertake a mass educational program with emphasis in the east to secure the adoption of Secretary of Interior Seaton's proposed Long Range Minerals Program. Governor Smylie brought up the fact that reception to this proposed program from governors of several midwestern and eastern states was only lukewarm. The sentiment in these latter quarters is that the Long Range Minerals Pro-

gram would be aiding the western states only. The governor advocated the lifting of the present restrictions now in force on the present barter program whereby domestically produced agricultural commodities are exchanged for foreign produced minerals. He forecast that by 1961 a balance between supply and demand for metals and minerals would be completely achieved.

R. T. McCall of Ingersoll-Rand Company presented a detailed description of the development and use of down-the-hole drilling. Primary advantages offered by Ingersoll-Rand's Drillmaster and Quarrymaster models are: more complete transmission of energy from the piston to the shank of the drill steel; strong, independent reverse rotation; and a more uniform hole. According to Mr. McCall, expected penetration rates with down-the-hole drills are four to six times those obtainable with churn drills. The first down-the-hole drill was introduced in the United States in 1954, and today there are more than 500 throughout the world. Though designed primarily for blast hole work

to depths of 125 feet, some operators have developed techniques that have enabled drilling to depths of 400 feet. He also reported an interesting underground application of down-the-hole drill units at the Delaware Aqueduct where two horizontal machines are mounted on a drill jumbo.

### **Dredging Uranium Minerals**

Robert A. Lothrop, mining engineer for Porter Brothers Corporation, described placer mining of highly strategic minerals near Bear Valley, Idaho. This operation is completely unique in that black sands are dredged, concentrated by jigs, and later separated by a combination of electrostatic and high intensity electromagnetic separators producing a columbite euxenite concentrate. The latter product is shipped to Malinckrodt Chemical Works in St. Louis, Missouri for chemical separation. A byproduct monazite concentrate is also recovered at the Bear Valley operation. The euxenite concentrates are separated at the Malinckrodt Plant into uranium oxide, columbium-tantalum pentoxides, rare earths residue, titanium residue, and thorium-iron residue. The uranium oxide is sold to the Atomic Energy Commission and the columbium-tantalum pentoxides are sold to the General Services Administration for stockpiling under the federal stockpiling program. Porter Brothers Corporation has invested approximately \$3,000,000 in this project and has an estimated 30-year reserve at today's rate of production. Because practically all of this country's columbium-tantalum requirements for both defense and domestic uses are imported from distant countries, the importance of this Idaho operation is apparent.

S. H. Willison, manager, Cordero Mining Company, reported the background which led to the development of the Western Governors Minerals Advisory Council. The primary purpose of the council is to serve as a consulting group for the 11 western governors. Through periodic meetings it is hoped to coordinate the thinking of the western states in providing a united front for mutual self betterment.

In the absence of Allan C. Johnson, manager, Idaho Operations Office, U. S. Atomic Energy Commission, Donald I. Walker delivered his talk on "The Growth of Atomic Energy in Idaho." All told, there are eight reactors now in operation at the National Reactor Testing Station at Arco, Idaho. In addition to these, five new reactors are under construction, and seven more are being blueprinted. The evolution of these machines, at an investment cost that will exceed

\$150,000,000 when 1957 construction is completed, is a direct reflection of the growth of Idaho's newest industry. In this talk it was brought out how many of Idaho's metals—lead, zinc, silver, cadmium, antimony, mercury, and cobalt—have been put to use at the NRTS at Arco. Idaho's oldest industry, mining, is contributing to and being benefited by Idaho's newest industry—atomic energy. According to Mr. Johnson, radioisotopes, which are byproducts of nuclear energy experiments and used in industrial processing and agriculture, are expected to ring up an annual saving of \$4,000,000,000 within the next three to five years. "Our nuclear weapons stockpile and the atomic power developments, costly as they are, are beginning to be borne by the largely unsung, but very benevolent, radioisotopes."

Metals application in atomic energy was a subject discussed by M. H. Bartz, Phillips Petroleum Company. Primary requirements for metal in the reactor construction are: corrosion resistance; resistance to deformation and property change at elevated

temperatures; good ductility and formability properties; low neutron absorption characteristics. In the latter category (low neutron cross section) beryllium, aluminum, magnesium, lead, tin, and zirconium possess this property. But not all have the other desirable properties listed above. Zirconium looks to be the most attractive, but processing and refining costs make it expensive.

In another talk, Donald I. Walker discussed the Atomic Energy Commission's Division of Inspection. This division is charged with the responsibility for making actual inspections to determine the compliance of licensees (those licensed to possess radioactive material) with the regulations and special conditions which may be imposed on each licensee.

The 1957 convention of the Idaho Mining Association was, without doubt, a success. This meeting, held every other year, is completely unique in that it is carried out midst an air of complete relaxation which is free from the tensions which dominate daily life. Everyone will be looking forward to 1959.



AIME OFFICIALS from left are Harry Marsh, Snake River subsection; Malcolm Brown, Columbia section; Roger Pierce, AIME vice president; S. M. Barton, Snake River; LeRoy Traeger retiring Idaho president; and J. C. Keiffer, Columbia section.



EVERYONE HAS A GOOD TIME at the Idaho Mining Association's Sun Valley Convention as this photograph of the smiling crowd indicates. Informality of dress is apparent but seriousness featured the talks on the lead-zinc situation.



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## United States

# Personalities in the News

W. P. MORRIS is the newly elected president of Duval Sulphur & Potash Company, succeeding the late GEORGE F. ZOFFMAN. Mr. Morris joined Duval's staff in 1950, as general superintendent of potash operations at Carlsbad, New Mexico. In



1954 he was transferred to Houston as vice president and assistant general manager and was promoted to executive vice president and director last March. Prior to his association with Duval, Mr. Morris served with International Minerals & Chemical Corporation and United States Potash Company.

Carlton D. Bailey has been appointed general superintendent of Pickands Mather & Co.'s Ironwood district in Michigan. Mr. Bailey previously served as assistant general superintendent. Other company appointments include: Frank Werther as assistant general superintendent for operations; John Wangaard, superintendent at the Cary mine, also named superintendent of the Peterson mine; Russell Jose, superintendent of the Geneva mine, also assumes superintendency of the Newport mine of the Mauthe Mining Company; and Bernard Carey promoted to assistant superintendent of the Cary mine.

William H. King, Denver mining engineer, has been appointed executive officer of the Defense Minerals Exploration Administration's field team in Region III. Mr. King, who was serving as superintendent of the Bureau's Denver experiment station, will direct DMEA operations in an eight-state area. Mining engineer J. F. Shaw is now acting superintendent of the Denver station.

H. C. Jackson, associate managing partner, Pickands Mather & Co., is the new chairman of the board of the American Iron Ore Association. Other newly elected officers are F. G. Pardee, association staff, president; H. S. Taylor, president Oglebay, Norton & Company, W. A. Sterling, president, Cleveland Cliffs Iron Company, and H. E. Johnson, association staff, vice

presidents; A. B. Rathbone, vice president, ore sales, Oglebay, Norton & Company, treasurer; and Hazel M. Ronk, association staff, secretary.

Jack Diskin has joined the staff of American Gilsonite Company in Bonanza, Utah. Mr. Diskin was previously a partner in the Tech-Ser Mining Company, Silverton, Colorado.

A. B. Henwood, Bunker Hill Company employee, was transferred from foreman of the leach department in the zinc plant at Kellogg, Idaho, to foreman of the plant's purification department.

Edward H. Eakland, Jr., formerly with the Anaconda Company, and Robert W. Osterstock, previously employed by American Metal Company, have formed an association as consulting mining geologists at 700 Newhouse Building, 10 Exchange Place, Salt Lake City, Utah.

Howard W. Balsley is the new president of the Uranium Ore Producers Association. Mr. Balsley had previously served as UOPA officer and was one of the principal figures in the organization of the association. Other newly elected officers are: William Orr, Grand Junction, executive vice president; Oscar Manol, Grand Junction, first vice president; and area vice presidents, Frank Woodard, Grand Junction, Central Plateau area; Phil Peter, Gillette, Wyoming, Wyoming-South Dakota-North Dakota area; Irving Andrews, Grand Junction, Grants, N. M. area, Ted Bonner, Santa Fe, New Mexico-Texas area; and E. E. Lewis, Grand Junction, vice president at large.

John S. McNabb has accepted a position with Twin Star Industries, Inc. of Austin, Texas, as head of the engineering department. Mr. McNabb was previously employed on the mining staff of International Minerals and Chemical Corporation of Chicago, Illinois.

M. K. Nicholson has been promoted to smelter general foreman at Chino Mines Division of Kennecott Copper Corporation, filling the position left vacant by the retirement of Frank M. Brown.

Rex R. Dusenberry, former general casting foreman at Kennecott Copper Corporation's Garfield, Utah, refinery, has been advanced to general casting foreman. George C. Earl, Jr. will take over the duties of assistant general casting foreman. T. J. Blair, former casting shift foreman, has been promoted to assistant general casting foreman. B. Blain Bradford has been promoted to mine industrial engineer, and Robert D. Higley was advanced to department of mills industrial engineer.

John Cameron Fox will succeed Arnold Buzzalini as secretary of the Society of Mining Engineers of The American Institute of Mining, Metallurgical and Petroleum Engineers, Inc. Mr. Fox has been serving as assistant manager of the mining division of American Metal Company, Ltd. Mr. Buzzalini plans to enter the field of consulting geology.

GEORGE F. MCKERECHAN has been named branch manager of Calumet & Hecla Incorporated's uranium operations in New Mexico. Mr. McKereghan began his career with Calumet & Hecla in 1947 as a miner. He was promoted to sales engineer for drill bits



and in 1950 was appointed mining engineer at the lead and zinc mines in Shullsburg, Wisconsin. In 1954 he returned to Calumet, Michigan, as special assignment engineer for the director of mining.

Plato Malozemoff was awarded an honorary degree of Doctor of Engineering at the annual commencement of the Colorado School of Mines recently in Golden, Colorado. Mr. Malozemoff is president of Newmont Mining Corporation. Distinguished Achievement Medals were presented to Alfred R. Flinn, eastern manager of mines for the New Jersey Zinc Company; Charles D. Michaelson, general manager of the Western Mining Divisions, Kennecott Copper Corporation; and Howard G. Washburn, director of Triumph Mining Company.

Clinton H. Crane, chairman of the board of trustees of St. Joseph Lead Company, has retired at the age of 84. St. Joseph Lead Company was organized in 1865 and Mr. Crane became the third president in 1913, a position he held for many years until he turned it over to the current president, Andrew Fletcher.

John B. Arthur was elected chairman of the board of the Mexico Refractories Company in Missouri. W. Basil Leach was elected president; Charles A. Smith, executive vice president; Carl H. Bachman, vice president in charge of production; and Roger A. Hitchins, vice president in charge of the national division.



WILLIAM J. MCKENNA (left) has been named to succeed CARLOS BARDWELL as manager of International Smelting and Refining Company's Tooele Plant in Utah. Mr. Bardwell will retire after 42 years of service with the company. Mr. McKenna is succeeded as general superintendent of the plant by EMILE W. STEINBACH (right), former assistant general superintendent. Mr. McKenna began his employment in 1916 and has held supervisory positions in several departments. Mr. Steinbach has been employed by International since 1924.

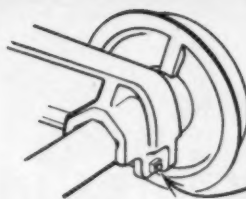
Continued on page 109

P. N. MILES (right) will succeed ALAN CONNOR as manager of the Mining Sales Division of Christensen Diamond Products Company. Mr. Connor is currently directing operations at Castle Concrete Company, a subsidiary of Christensen. Mr. Miles, a University of Utah graduate, has been directly concerned with the sale of diamond bits and allied equipment to the mining industry since he joined the company in 1951. In his new capacity he will direct the company's mining sales activities in the United States, Mexico, and South America.

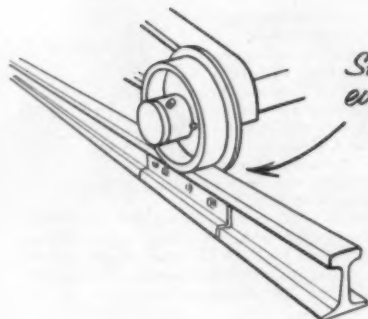




*Movement between bolster and side frame is taken on specially designed wear surfaces*



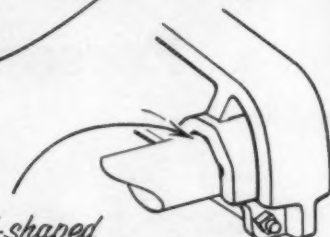
*Quick wheel change*



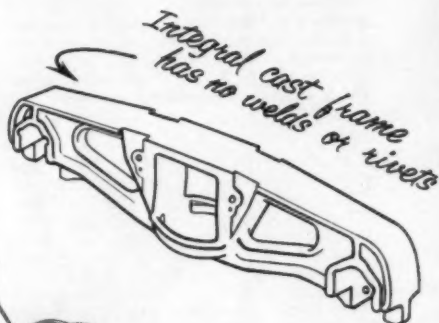
*Smoother ride even on rough tracks*



*Large center bearing for longer life*



*V-shaped machined axle grips for controlled flexibility and truck alignment*



*Integral cast frame has no welds or rivets*

*Check these "plus" features*

## OF NATIONAL NC-1 TRUCKS

If you're considering the purchase of new 8-wheel mine cars . . . or if you're thinking of modernizing older cars—now is the time to check the advantages of National NC-1 Trucks. National NC-1 Trucks have controlled flexibility for track variations yet still maintain truck alignment through their machined V-shaped axle grips. In addition, NC-1 Trucks have a built-in shock absorbing mechanism.

You get more out of your mine car investment per workshift . . . per day . . . per year. And at the same time you minimize spillage . . . get greater protection for your equipment, track and structures . . . slash maintenance to a new low.

Yes, now is the time to check National NC-1 Trucks—they make sense for 8-wheel mine cars . . . make dollars for operators, too.

WILLISON AUTOMATIC COUPLERS  
RUBBER CUSHIONED UNITS  
NC-1 CAR TRUCKS • NACO STEEL WHEELS  
NACO STEEL LINKS & SWIVEL HITCHINGS

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Established 1868

Cleveland 6, Ohio

# Newsmakers in International Mining



**WALTER C. SMITH** (left) has been appointed consulting metallurgist of the Cerro de Pasco Corporation. **IRVING L. BARKER** will succeed Mr. Smith as resident metallurgist with headquarters in New York, New York. Mr. Smith has been associated with the corporation since 1927, serving at La Oroya, Peru as well as in the United States. Mr. Barker joined Cerro de Pasco in 1934 and has been employed as general superintendent at La Oroya prior to his appointment as resident metallurgist.



**Claude E. Fertig**, manager of Ito-gon-Suyoc Mines, Inc., Baguio, Philippine Islands, is spending four months in the United States and will visit uranium mining operations in Wyoming. Mr. Fertig is the brother of Western Nuclear Corporation's vice president, **Wendell W. Fertig**.

**Charles Bourge** has been promoted to director general of M. G. L. at Kivu, Belgian Congo. Mr. Bourge was previously director of M. G. L., Costermansville, Belgian Congo.

**Senor and Senora Bernardo Pizarro** and **Senor and Senora Carlos MacDonald** of Santiago, Chile, were recent guests of the Anaconda Company in Montana. **Senor Pizarro** and **Senor MacDonald** are attached to the Technical Section of the Copper Department of the Republic of Chile.

**Dr. Istvan Karsay** has joined the staff of the International Nickel Company's Research Laboratory at Bayonne, New Jersey, as a research metallurgist in the Ferrous Castings Section. Dr. Karsay arrived in the United States from Hungary, where he was employed as a research metallurgist at the Iron Research Institute, Budapest, from 1951 to 1956.

**F. V. Zirconi** has taken a position with the Fresnillo Company, Naica, Chihuahua, Mexico.

**Mr. Albert Pessin** has accepted the position of consulting metallurgist of the Philex Mining Corporation, Manila, Philippine Islands. Mr. Pessin was formerly mill superintendent of Shattuck-Denn Mining Company, Iron King branch, Humboldt, Arizona.

**C. PENGILLY**, who is assistant manager and underground manager of the Havelock Abestos mine in Swaziland, South Africa, recently visited several mines during his tour of the Copperbelt of Northern Rhodesia.



**Manindra M. Sinha**, **Pervez M. Mehta**, **Anthony D'Souza**, **Joginder Singh Saini**, **V. S. Krishnaswamy**, and **Ramakrishna Lyer**, employees of the Tata Iron & Steel Company, Jamshedpur, India, arrived in the United States for a six-month study of operations at Kaiser Steel Corporation, Oakland, California.

**Sinclair H. Lorain** has announced his retirement from the position of Bureau of Mines assistant regional director for Alaska. Mr. Lorain has retained this position since 1949. Future plans include a possible foreign assignment in Tehran, Iran, this winter.

**Merton I. Signer** has been appointed manager of the Saskatchewan potash project of International Minerals & Chemical Corporation. Mr. Signer has been exploration superintendent for the potash division in Saskatchewan since February 1955. **Robert H. Lane**, former mine engineer at the Carlsbad, New Mexico, operation, has been named mine superintendent of the potash project. **Wm. A. Seedorff** will advance from the position of project engineer at the Carlsbad plant to engineering superintendent for the Canadian project.

**Stanley W. Johnson**, superintendent of American Smelting & Refining Company's Plomosas Unit in Mexico, has been awarded one of the 36 Sloan Fellowships at the Massachusetts Institute of Technology, and will study there for one year. The fellowships are awarded as part of M.I.T.'s School of Industrial Management executive development program. Mr. Johnson has been associated with ASARCO since 1949, in the capacity of junior engineer, shift boss, mine foreman, and superintendent.

**Fred L. Humphrey**, associate dean of the School of Mineral Sciences, Division of Mineral Technology, Stanford University, has been granted a two-year leave of absence from Stanford to organize a School of Geology at the University of Bahia in Brazil.

**Dr. Ralph B. G. Yeo** has joined the staff of the International Nickel Company's Research Laboratory at Bayonne, N. J. as a member of the Steel Research Section. Dr. Yeo was formerly a lecturer in the Metallurgy Department, University of Witwatersrand, Johannesburg, South Africa.

**Eric A. Lenze**, general superintendent of the Samar Mining Company, Philippine Islands, is on a tour of the United States and Europe to observe modern mining methods and techniques.

**A. G. Mills**, technical superintendent of the Electrolytic Refining and Smelting Company of Australia, Pty., Ltd., at New South Wales, will transfer to works manager, Australian Aluminum Production Commission's plant at Bell Bay, Tasmania.

**H. C. Koch** will succeed **C. B. Anderson** as president of the Transvaal and Free State Chamber of Mines. **P. H. Anderson** and **I. M. Campbell-Rodger** were elected vice presidents.



**GIUSEPPE BELLAVITA** (right) and **ROBERTO ANTONIOLI** will be guest speakers at the Swedish Mineral Conference to be held September 19 through 21 in Stockholm, Sweden. Both men are employed at Miniere di Montevicchio, Italy; Mr. Bellavita as vice manager of ore dressing mill, Mr. Antonioli as mill superintendent. They will present a paper on the use of "jigs concentrates and flotation concentrate as heavy media in sink-float plants."

**Irving L. Barker**, former general superintendent of smelting and refining at the Oroya operation of the Cerro de Pasco Corporation in Peru, has been transferred to the New York office of the corporation. Before joining Cerro de Pasco in 1934, Mr. Barker was with The Anaconda Company in Chile, and prior to that was with American Smelting & Refining Company at the copper refinery in Baltimore, Maryland.

Three representatives of the French Iron Mines Delegation visited the Potash Division of International Minerals & Chemical Corporation at Carlsbad, New Mexico recently. The visitors were: **Robert Bennes**, assistant general manager, Mine de la Mourriere; **Louis Paillard**, general manager of Mine D'Angevillers; and **Raymond Barbier**, general manager, Mine Marival-de-Fer.

**Manuel Elizalde**, head Elizalde and Company enterprises, has been elected chairman of the board of directors of Marinduque Iron Mines Agents, Inc. **Jesus S. Cabarrus** has been reelected president and **Jacob E. Cabarrus**, vice president. Other officers are **Pacifico de Ocampo**, secretary; and **Jose Cabarrus**, treasurer.

**Daniel Bedouret**, former deputy chief of the technical department in Paris of the French Overseas Territories Bureau of Mines, is now assistant to the local director of Bureau Minier de la F.O.M. at Brazzaville, French Equatorial Africa.

**A. G. MILLS** has accepted a position as works manager of the Australian Aluminum Production Commission's plant at Bell Bay, Tasmania, Australia. Mr. Mills has been serving as technical superintendent of the Electrolytic Refining and Smelting Company, Pty., Ltd., Port Kembla, New South Wales, Australia.





Michigan Model 175A loads crushed stone into stationary hopper at end of 480-ft conveyor leading to concrete batch plant.

## **6,750 cu ft of concrete per hour,** *from automatic batching system fed by Michigan Tractor Shovels,* **paces Peter Kiewit paving crew**

Peter Kiewit Sons' Company, Omaha, started construction of the new Minot (North Dakota) Air Force Base as originally planned for jet interceptors. But when the Air Force decided to base B-52-type heavy bombers there as well, a longer, wider, stronger runway became a sudden necessity. Modified plans doubled width to 300 ft, extended length well beyond the original 8100 ft. Key installation was a 50 ft ribbon of concrete, 16 inches deep, centered along the full length of the runway. To finish the greatly enlarged contract ahead of penalty date,

concrete pours had to average 2,000 cubic yards per 8-hour day.

### **Kiewit owns 16 Michigans, two used here**

Faced with this tight schedule, the Kiewit crew turned to an automatic concrete batching plant *and modern high-speed material feeding methods*. According to R. D. Wilson, Kiewit Area Manager, the *entire* paving



Normal carry position, slightly above ground level, eliminates possibility of stone-crushing dozing action; yet permits high-speed travel without spillage-loss.

operation was planned around the known productive ability of Michigan Tractor Shovels. Two of Kiewit's 16 Michigans, both big Model 175As, were brought in to feed the batching plant via mobile and stationary hoppers and automatic conveyors. Handling 3,200 tons of aggregate per day, these 2¾ yard Michigans had to deliver heaped buckets every time—and they did! Their big loads, delivered fast, kept plant at peak production of 180 batches (each 37.4 cu ft) per hour, day after day . . . making the job possible—and profitable!

### Michigans eliminate pulverizing problem

One of the major advantages of the Michigans was that, despite their speed, the big low-pressure tires compacted—but never pulverized—the stone underfoot. Thus Kiewit eliminated a major problem—the crushing and grinding of aggregates often experienced when crawlers are used. Trucks delivering the stone dumped at the edge of the air field; there the Michigans took over. These fast, highly-maneuverable units loaded the material, carried it up steep ramps to build and maintain huge stockpiles.

### "Fast, dependable, easy to repair"

"Another reason we put Michigans on the job was we knew they require very little maintenance," says Paving Supt Max Woodard. "When repairs are necessary, excellent accessibility makes it an easy job. We've also found these machines have enough power to do anything we want. They're fast, too. Our operators like the way they handle. We like the way they kept those hoppers full. Fuel? One tank of diesel oil (50 gallons) keeps them going all day long! That torque converter's good and the power-shift transmission is a big improvement over other machines. Michigans have done a nice job for us."

### Make this test

Chances are, Michigans can do a "nice job" for you, too, no matter what bulk materials you have to move. But there's an easy way to find out first hand! Simply ask your Michigan Distributor for a free demonstration—no obligation, of course. If what you see looks good enough to buy—and we think it will—your distributor has a wide range of purchase plans . . . including Clark's popular Lease-Purchase which lets you put one or more Michigans to work without spending a cent of capital.



Clean design of bucket mechanism gives operator excellent visibility when dumping into hopper.



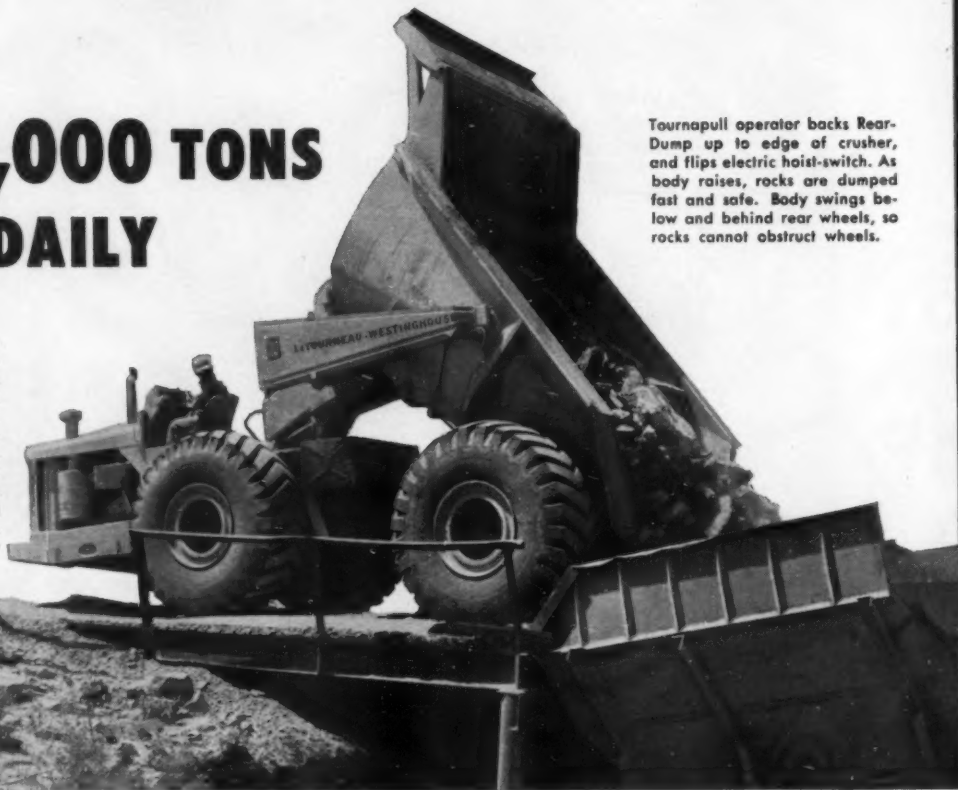
Another of Peter Kiewit's Michigans serves as all-around handyman on company's Indiana Turnpike contract. This 102 hp 2 yd Model 125A lifts up to 11,000 lbs, carries 5,500 lbs at 4 mph.

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Michigan is a registered trade-mark of  
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# HAULS 4,000 TONS OF ROCK DAILY ERROR

This ad, which appeared in June 1957, contains an obvious error. The 4,000 tons mentioned was the total amount hauled daily by all three Rear-Dumps... not the amount per machine. LeTourneau-Westinghouse Co. believes in truthfulness and integrity in its business dealings with its customers and prospects. In keeping with this policy we offer our apology for this misleading statement.



Tournapull operator backs Rear-Dump up to edge of crusher, and flips electric hoist-switch. As body raises, rocks are dumped fast and safe. Body swings below and behind rear wheels, so rocks cannot obstruct wheels.

An abundant supply of base material was vital to Broce Construction Co., Dodge City, Kansas, U. S. A., when they began putting an 18" base on a 10-mile section of highway. Nelson Bros. Quarries, La Harpe, contracted to supply Broce with more than 400,000 tons of stone and sand for necessary base material. In order to maintain the continuously high rate of aggregate production needed, Nelson Bros. relied on their 3 high-speed, 22-ton LeTourneau-Westinghouse C Tournapull Rear-Dumps. These high-speed haulers moved material from pit to crushing

plant at a fast pace, hauled 4,000 tons of blast-rock daily ~~per machine~~.

## Average 22 tons of rock per load

At Nelson Bros.' quarry, 3 mi. northwest of Reading, C Rear-Dumps worked with 2½-yd. shovel. Their short 90° turn radius enabled operator to maneuver machines easily, and spot fast under dipper. Each L-W Rear-Dump was loaded with 22 tons of blast-rock in 1¼ min. Rear-Dump's wide 8'9" bowl, with low rear-entry, provided large, easy target area for shovel operator... reduced spillage and clean-up. Since shovel operator did not have to "lift" dipper high to get in and out of bowl, he saved valuable time on bucket's swing-cycle. This, plus time saved in hauling, maneuvering, and dumping, enabled Rear-Dump to make more round-trips... haul more tonnage per working-day.

## Big brakes add safety on downhill hauls

'Pulls' multiple disc air brakes on all 4 wheels provided 3,762 sq. in. of braking surface for safe hauling on down-grades. At crusher, operator swung in fast... set rear-wheel brakes... and touched electric

switch on control panel to activate hoist-motor and raise body. As bowl tilted, it swung discharge lip below and behind rear wheels... kept rocks from slipping underneath wheels as Rear-Dump fed load directly into crusher.

## "These machines beat anything"

Supt. Carl A. Nelson reports his Tournapull haulers work profitably and efficiently. He said, "We have had excellent service from our Rear-Dumps. They haul from quarry pit to crusher, and have to take abuse on that type of work — but they are plenty rugged to take it." Nelson added, "They have plenty of power... can say we've had trouble-free service. We've worked all winter, in all kinds of weather. We can always depend on quick, easy starting on coldest days. These machines beat anything I've seen."

## Heavy-duty haulers for tough jobs

For rugged, heavy-duty haulers to handle those tough jobs at your quarry, investigate the advantages of Tournapull Rear-Dumps. They take rough treatment, give you continuous high production. Write us for complete details.

Tournapull—Trademark Reg. U.S. Pat. Off. CR-1195-Q-bw



Note big 22-ton rock load in heavy, welded-steel Tournapull Rear-Dump body. On this rugged pit job machines successfully withstood much of this hard pounding.



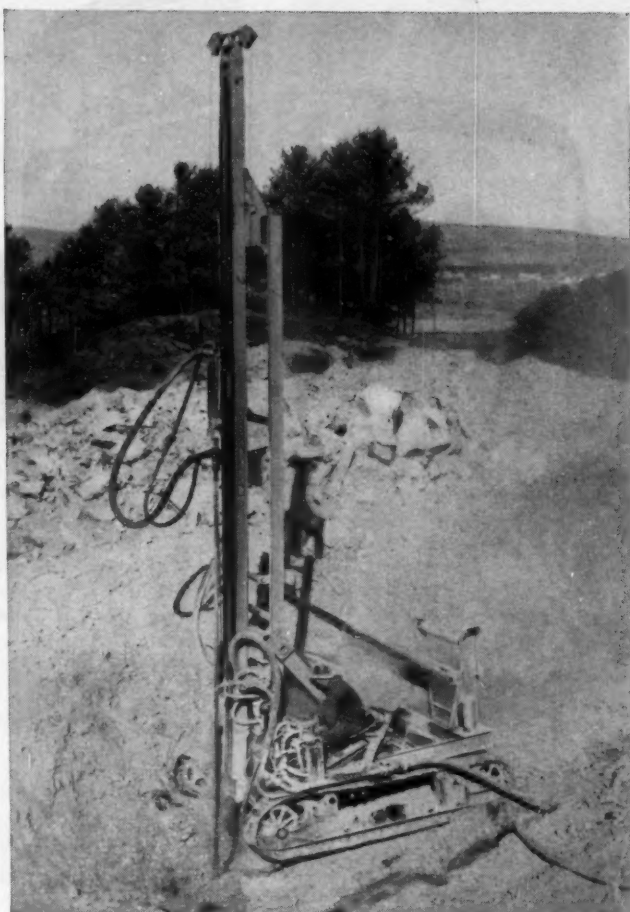
**LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS**

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

**Going down...  
down...  
down...  
with a  
Gardner-Denver  
DH143**

Don't settle for halfway measures when you want rock drilling depth. Move in and drill deep holes fast with the Gardner-Denver DH143. This hard-hitting rock drill has a 5½" hammer diameter . . . handles rod changes to 20' . . . delivers the heavy-duty, deep-hole punch needed in pits, quarries and open cuts. It allows you to select the proper bit and plan the proper spacing for the best breakage in any ground.



**GARDNER-DENVER SECTIONAL DRILL ROD EQUIPMENT WITH RING SEAL SHANKS**



Use Gardner-Denver ring seal shanks and sectional drill rods with the DH143. They are made like the highest quality rock drill parts. Special steels combined with the finest metallurgical techniques—shot peened and carburized—give this drill steel lasting deep hole drilling durability.

- 1 Ring Seal Shank**—trouble-free, long-wearing "O"-ring seal.
- 2 Threads**—specially long for greater durability.
- 3 Couplings**—designed and developed for the job.
- 4 Rods**—specially treated like the finest quality rock drill parts.
- 5 Carbide Bit**—holds gauge on deepest holes.



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Export Division, 233 Broadway, New York 7, New York



## Another New and Bigger Forward Control 'Jeep' Truck

Here's the bigger, more powerful, 7,000-pound GVW Forward Control 'Jeep' FC-170 Truck:

- **Advanced Forward Control design!** The same new, advanced features that made the Forward Control 'Jeep' FC-150, an immediate success.
- **More cargo space on less wheelbase!** A 9-foot flatbed pickup box on a wheelbase only 103½-inches long! Bed is 27-inches from ground for back-saving ease of loading!
- **More efficient space utilization!** Compare it with any other 4-wheel drive truck — *only* the FC-170 gives you so much cargo space per inch of wheelbase!

- **All-time high for "big-load" maneuverability!** The FC-170 is the *only* 4-wheel drive truck to give you "go-anywhere" 'Jeep' maneuverability with a payload capacity of up to 3500-pounds.
- **Other outstanding features!** It's really a 4-wheel drive truck — *not* a modified 2-wheel drive truck, *not* a conversion! High-torque Hurricane 6-226 engine, time-tested and performance-proved • spacious Safety-View Cab • big wrap-around windshield • wide 63-inch tread for ground-gripping stability in off-road travel • shifts easily into 2-wheel drive for highway travel • with power take-off, operates a wide range of special equipment from winches to belt-driven machinery.

The newest addition to the 4-Wheel-Drive 'Jeep' family...ready for the bigger, tougher jobs!



**SPACIOUS SAFETY-VIEW CAB** puts you in a "Forward Control" position, gives you greater command of any driving situation.



**EXTRA 4-WHEEL-DRIVE 'JEEP' TRACTION** takes heavy loads to off-road areas impossible for ordinary vehicles to reach.

**'Jeep'** *Forward Control*

---

4-Wheel-Drive **FC-170**

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WILLYS... world's largest manufacturers  
of 4-Wheel-Drive Vehicles

Willys Motors, Inc., Toledo 1, Ohio

# Euclid tractors and scrapers



## lower stripping costs for mines and quarries

Tremendous power, speed and maneuverability make the 436 h.p. Euclid TC-12 Twin-Power Crawler a top performer in heavy duty mine and quarry work. No other tractor matches it for low cost production in stripping overburden, clearing, stockpiling, building haul roads and other big tractor jobs.

Euclid scrapers have struck capacities from 7 to 24 cu. yds. with engines ranging from 143 to 518 h.p. The complete line, including both two axle

and three axle models, has hydraulic lever action that eliminates down-time caused by cable breakage. Good maneuverability and fast travel speed reduce cycle time . . . help move more loads and more yards for lower cost stripping operations.

Check the many advantages of "Eucs" for your operation . . . have a Euclid dealer show you why *Euclids are your best investment.*

EUCLID DIVISION, GENERAL MOTORS CORP., Cleveland 17, Ohio



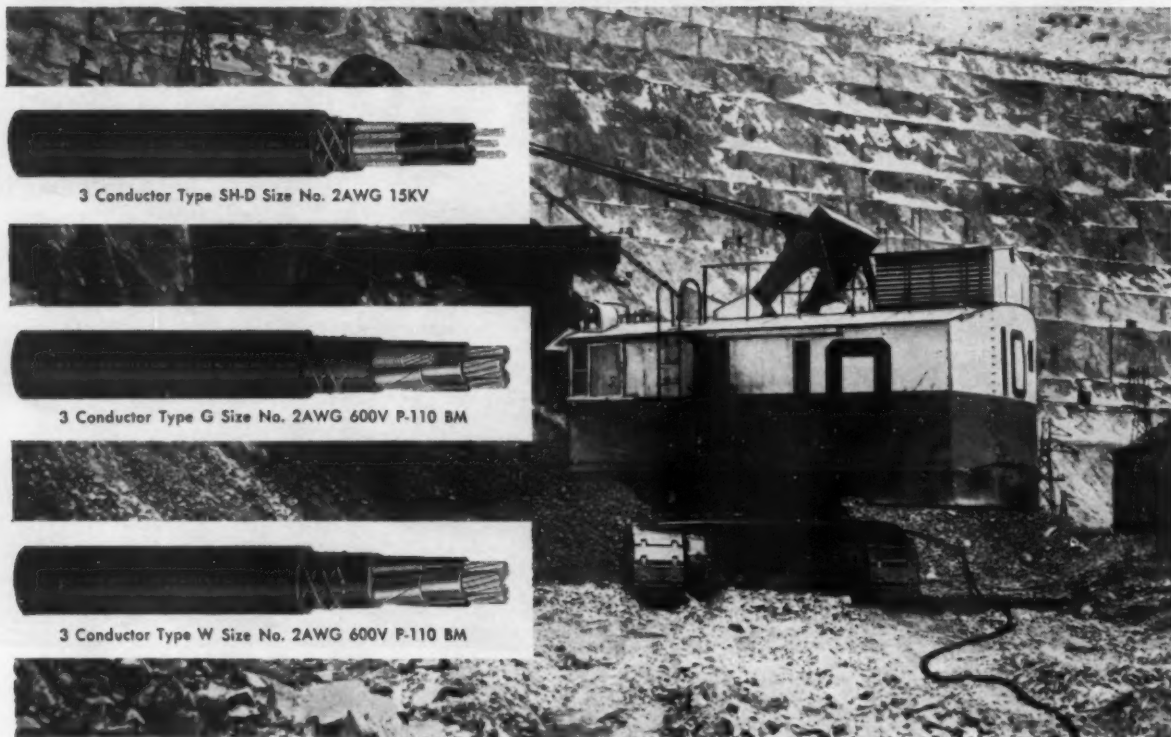
# Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE



**GENERAL CABLE SUPER SERVICE**

# **PORTABLE POWER and MINING CABLE**



## **with SUPERTUF Jacket**

GENERAL CABLE offers a complete line of SUPER SERVICE portable power and mining cables which will stand up under the most severe operating conditions and furnish longer life and reliable service no matter how difficult the application.

All SUPER SERVICE cables are jacketed with an extra heavy duty, vulcanized in mold, double layer cord reinforced "SUPERTUF" neoprene sheath with maximum resistance to tearing, cutting, abrasion and overall mechanical abuse, and

possessing outstanding resistance to water, oil, acids, alkalis, flame and effects of sunlight and weathering.

SUPERTUF neoprene jacket far exceeds the requirements of ASTM D-752, and all 600 volt SUPER SERVICE portable cables bear the official approval number P-110 BM embossed in the jacket indicating compliance with the flame resistance requirements of the Pennsylvania Department of Mines and requirements of the Federal Bureau of Mines.

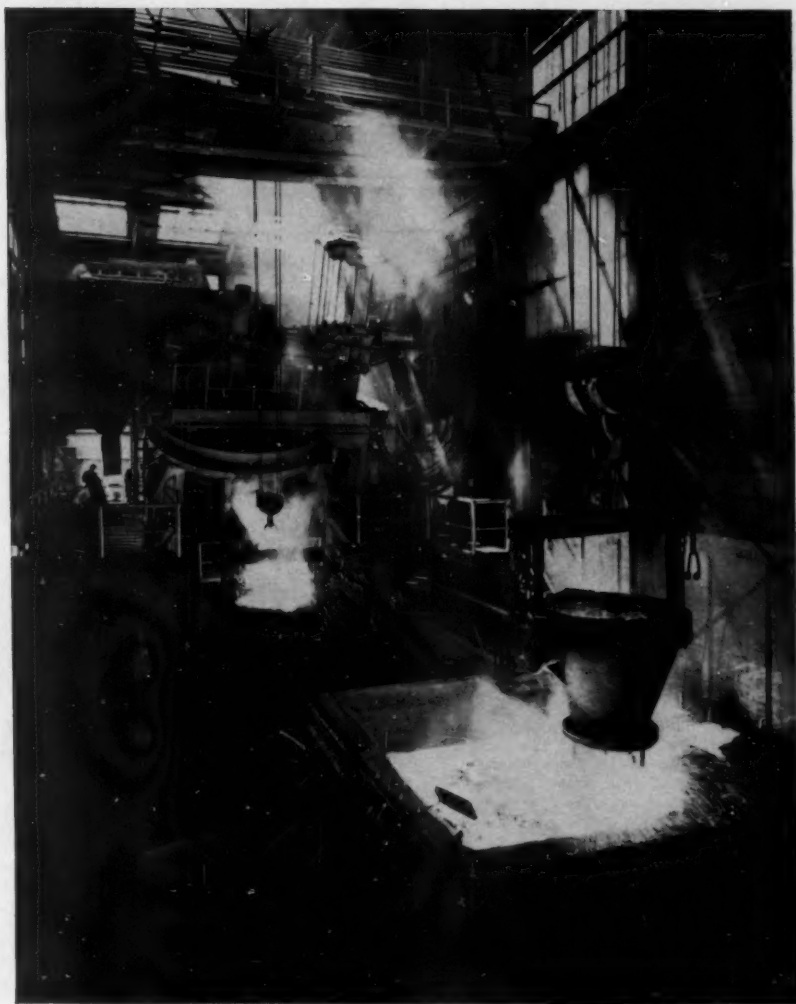
**GENERAL CABLE CORPORATION**, 420 Lexington Avenue, New York 17, New York  
Offices and Distribution Centers Coast-to-Coast

*for quality and service . . . specify*

**GENERAL CABLE**



● MT Lectromelt Furnace  
at Pittsburgh Metallurgical  
Company, Inc., Charleston,  
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With the electric furnace process employed here at Pittsburgh Metallurgical, rigid supervision of all phases of production is maintained. This assures top-quality output.

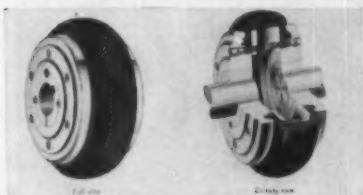
Lectromelt furnaces and equipment for smelting and refining are described in Catalog No. 105. You may have a copy by writing Lectromelt Furnace Division, McGraw-Edison Company, 324 32nd Street, Pittsburgh 30, Pennsylvania.



\*Reg. T. M. U. S. Pat. Off.

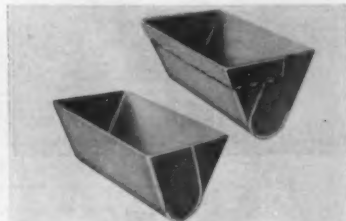
# PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD's way of making available to you some of the finest current information on mechanization.



## Dodge's Flexible Cushion Coupling Has Rubber Tire

Para-flex, described as a wholly new conception in flexible couplings, is announced by the Dodge Manufacturing Corporation, Mishawaka, Indiana. A rubber tire, the heart of this unit, enables the coupling to handle angular misalignment, parallel misalignment and end-float, in any combination. The flexible member also cushions shock loads and diminishes torsional vibration, thus protecting both the driver and the driven machine. Use the reader service card to write the company for further information.



## "J" Elevator Buckets are Brake Formed

A new, welded-steel elevator bucket is being manufactured by Wincar Welders, Long Beach, California, and marketed under the tradename of "J" buckets. The name is earned by the "J" shaped weld on each side of the bucket. The new buckets are brake-formed from a single, shaped steel plate. They are light in weight, yet exceedingly strong and long-lived. Corners are round, smooth and free of welds and other irregularities, resulting in a rapid and complete bucket discharge. Circle No. 60 for further information.

## Maps of Grants Uranium District Now Available

A series of four geological maps showing all ore bodies, and drill hole patterns to scale have been prepared for the Grants, New Mexico uranium district. These maps cover the southern end of Amrosia Lake and cover T. 13 N. from R. 8 W. to 11 W. Over 1,000 drill hole

locations are shown on one map. Todilto and Dakota rims are shown as are all faults, shafts, access roads, etc. Thomas W. Mitcham has been retained by Mineral Map, Box 1414, Flagstaff, Arizona in preparing these maps. Use reader service card to write Mineral Map for further information.



## Copco's New Self-Loading Self-Discharging Car

A combination mucking machine and self propelled, self unloading ore car has been developed by engineers of the Montevecchio Mine, Sardinia (See Mining World, July, 1955) in conjunction with the Atlas Copco, Stockholm, Sweden. The car, called the "Montevecchio," has a built-in power shovel, loads itself, and can move to a dumping point at the rate of approximately four feet per second. Two models are presently in production, the model T2G, with a 3½-cubic foot bucket and 27-cubic foot car capacity, and the model T4G, with an 8½-cubic foot bucket and 60 cubic foot car capacity. The rubber tired machine can climb a 12 per cent slope, and its operating distance is about 300 feet. For further information, use the reader service card and write Atlas Copco Pacific, Inc., 930 Brittain Ave., San Carlos, California.



## 40% Payload Increase For Bell 47J Ranger

A payload increase of more than 40 per cent for Bell's Model 47J Ranger helicopter was recently announced by officials of Bell Helicopter Corporation.

Certification for the new gross weight of 2,800 pounds was made by the CAA after tests at the Bell plant. According

to the company, the new weight increase can be made available for 47J's now in operation with only minor modification. With the additional payload, it will be possible to carry the equivalent of five persons instead of the usual four. Circle No. 59 for additional information.



## Centrifugal Concentrating Pans for Clayey Gravels

Knapp & Bates Ltd., England, have developed a new mobile concentrating pan designed especially for tough clay bearing gravels. Excellent results are being presently obtained from the processing of alluvial type deposits of tin and diamonds. The pan, containing revolving spiral arms, breaks up the tough clays, and forms a concentrate and tailings. Concentrates should then be jigged to bring them up to shipping grade. The unit, available in a variety of sizes, features low water consumption, and high efficiency. Smaller units may be supplied for manual operation, while larger units are adaptable to either electric, gasoline, or Diesel power. Circle No. 58 for additional information.



## Rugged Mining Tire By Dunlop Tire & Rubber

Called the Super Gold Cup Logger Excavator, this tire designed for mining was developed by the Dunlop Tire and Rubber Co. The tire features tension free construction, strengthened with four nylon breaker strips. The tread pattern provides for both lateral and circumferential traction. Designed primarily for off-road service under heavy loads, the tire is also suitable for short hauls on paved ground. Circle No. 53 for more information.

**SYMONS V-SCREENS:** Nordberg Mfg. Co. Milwaukee, Wisconsin, have available for you a new brochure on their Symons V-Screens. According to the company these screens give high capacity for sharp, single cut, wet or dry separations, especially in the finer sizes. This sharp separation and high capacity is the result of using centrifugal force applications. Use the reader service card, and write to company for your copy.

**TANK BULLETIN:** In case you haven't investigated the advantages of using wooden tanks, or wood stave tailing pipe, write to the Santa Fe Tank Division, Flour Products Co., 12,000 E. Washington Blvd., Whittier, Calif., for a copy of their recent Mining Tanks Bulletin. Use the handy reader service card.

**VENTILATION ENGINEERS** will want a copy of Joy Manufacturing Company's bulletin on the new Joy Microdyne dust collector. The Microdyne is 1/10 to 1/20 the size of any other dust collecting unit and offers an efficiency rating of over 99 per cent down to 5 microns. It can be easily bolted into existing ductwork. Circle No. 1 for your copy of the Joy Microdyne bulletin.

**WEARPACK TEETH:** American Steel Foundries, Industrial Castings Div. have developed a new type dipper tooth which they claim has a minimum hardness of 477 Brinell. Due to their hardness, teeth feature long life. New design keeps teeth sharper, longer. Circle No. 5 for free booklet.

**LUBRICATION EQUIPMENT:** A complete catalog on Alemite lubrication equipment is now available for you. Included is a description of the new Alemite hand guns which develops 10,000 pounds pressure, more than enough for ordinary lube jobs. Circle No. 11 for your copy.

**TWO-YARD LOADER:** Literature is available for you describing the new Tractomotive loader. The TL-20D Tracto-Loader features simplicity of one lever control of all speeds, forward and reverse, shifting into and out of any gear, at will, "on the fly," and many other features. Circle No. 12 for TL-20D literature.

**FAITHFUL PERFORMANCE** on important jobs is claimed by the manufacturer's of Aurora centrifugal pumps. The Aurora Pump Division, The New York Air Brake Co., have available for you a wide range of both centrifugal and turbine-type pumps serving many needs. Circle No. 14 for catalog "M" describing the complete line.

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**NEW MULTICLONE:** Western Precipitation Co. have recently introduced to industry the new "9VGR" Multiclone mechanical dust collector. Using field service proven cast iron tubes and vanes, the new 9VGR features simpler installation, lower erection costs, minimum dust stratification, no need for continuous external support, and high efficiency dust collection. A booklet on the "9VGR" is available for you. Use the reader service card and write the company at 1036 West Ninth St., L.A. 34, California.

**PROGRESSIVE TRUCK OPERATORS** use LPG. The reason why is explained in a booklet published by Hall-Scott Engine Co. LPG (liquefied petroleum gas) burns clean and complete with less carbon monoxide in the exhaust than in other types of fuel. For the whole story, circle No. 15.

**PREFABRICATED HMS** plants with Akins separator and densifier are described in Manual 56 by the Colorado Iron Works Co., 1624 17th St. Denver 2, Colorado. The plants, constructed by Southwestern Engineering Co. are compact, simple in design, and convenient to use. For your copy of Manual 56 write the company, using reader service card.

**FLEX VALVE:** The Farris Flexible Valve Corporation have available for you a new 48-page catalog detailing the Farris line of flexible, pinch-type, hose-bodied valves in both Standard and new Super-Seal metal-enclosed designs. Circle No. 2 for your copy.

**AUTOMATIC SAMPLER:** The Galigher Company, Box 209, Salt Lake City 10, Utah, have available for you an excellent catalog describing the applications of the Geary-Jennings sampler. Covering also some of the theory of automatic sampling, the book is yours by writing direct to the company. Use attached reader service card.

**TROUBLE SHOOTING** for Cummins Diesels is the subject of an interesting and informative brochure released by the Cummins Engine Co. Inc., Columbus, Indiana. The bulletin is designed to unfold so that it can be used as a wall chart. On the chart complaints are listed and probable causes are noted. For your copy write the Service Division of the Cummins Engine Company.

**SCOTCHLITE** Reflectorized Signs are now distributed by the Mine Safety Appliance Company, 201 North Braddock Ave., Pittsburgh 8, Pennsylvania. According to the company the beam of a miner's cap lamp kindle "Scotchlite" Sheeting into reflective power up to 230 times greater than that of a white painted surface. These signs are a "must" in your safety planning. Write direct to company for complete catalog.

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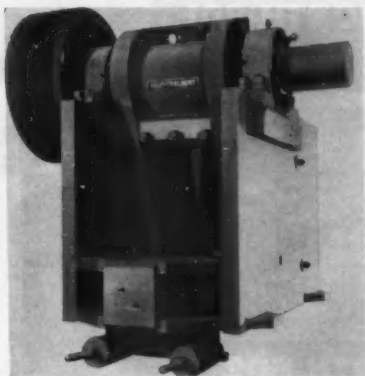
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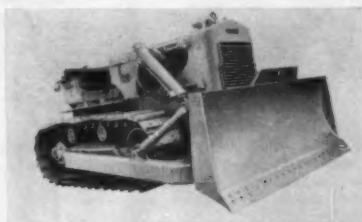
### A-C Announces New Single-Toggle Jaw Crusher

A new heavy-duty single-toggle jaw crusher (Model ST), which combines the best features of single-toggle and heavier double-toggle machines, has been announced by Allis-Chalmers Manufacturing Co., Milwaukee 1, Wisconsin. The new crusher has a capacity range between 180 and 360 tons per hour, and is available in 30- by 42- and 42- by 54-inch sizes. For further information write to the company on attached post card.



### Davey Oilers Use "Drop-In-Pressure" Principle

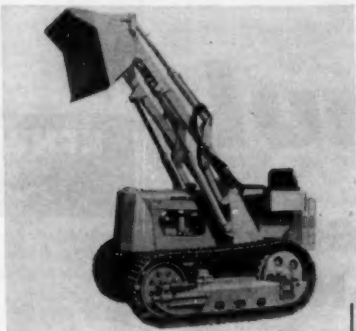
A new series of line oilers for rock drills has been announced by Davey Compressor Co. The new oilers operate on the "drop-in-pressure" principle. When rock drill throttle is closed, air hose and oiler oil chamber build up to line pressure. Then, when throttle is opened line pressure in hose drops slightly and reducing pressure in the oil chamber carries oil through the suction tube into the air hose. This assures ample oil at start of drill operation, as well as even flow during drill operation. Circle No. 54 for additional information.



### Oliver OC-18 Offered With New Bulldozer

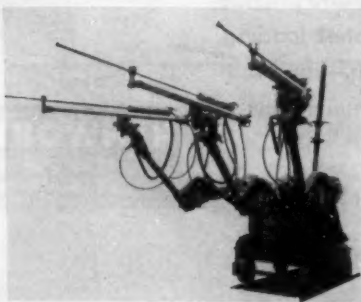
Oliver's big model crawler, the 133 drawbar horsepower OC-18, is now avail-

able with a new engine-frame mounted bulldozer. A strong, simple hookup arrangement is used to anchor the hydraulic cylinders to the engine frame on both sides. Heavy box-section push arms pivot on the track frame and have a far-back mounting point for greater blade lift above ground—47½-inches. Power steering simplifies operation of the unit. Circle No. 57 for additional information.



### Oliver Corp. Features New Tractor Loader

A high-speed digging and loading machine is now available in the new Oliver OC-46 loader with backhoe attachment. Built as a tractor-loader with a ¾-cubic yard bucket, this unit features a 22 d.b.h.p. engine with four-speed transmission. This combination of power and speed selection gives the most rapid cycle in any operating condition. Built with heavy, rigidly mounted frame for extra loader strength, the OC-46 also features fast acting hydraulic loader controls. Circle No. 55 for additional information.



### Thor Announces New Three Boom Mine Drill Jumbo

Development of a new completely air operated three-boom mining drill jumbo has recently been announced by the Thor Power Tool Company, whose engineers say it will effect time and cost savings up to 50 per cent. Introduced at the recent American Mining Congress Exposition, the unit is the biggest single tool or machine ever built by Thor. The giant new jumbo can operate at maximum efficiency in an area as large as 18 feet wide and 10 feet high. It weighs 7,800 pounds completely equipped with drifter rock drills and mountings. Thor engineering has simplified operation of the machine to the point that one man can operate the three booms without leaving his station at the air controls. Circle No. 56 for complete information.

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82-S	8" x 3"	¾" - 1½"
1102-S	10" x 3¾"	1½" - 1¾"
6-S	6" x 1½"	¾" - 1½"
8-S	8" x 1½"	¾" - 1½"
62	6" x 1½"	¾" - 1½"
106	6" x 1½"	¾" - 1½"
108-R	8" x 1½"	¾" - 1½"
110-R	10" x 1¾"	¾" - 1½"
112-R	12" x 1¾"	¾" - 1½"
410	10" x 1¾"	¾" - 1½"
412	12" x 2½"	¾" - 1½"

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These rugged movers are built big all over! Ton for ton, Kenworth end-dump trucks have greater strength for longer life and less maintenance. Engineered for more driver comfort, safety and control, these production builders are spring mounted—supply unsurpassed visibility and dime-sized turning radius. Extra rugged, their variable section frames are designed to provide deepest sections at points of greatest loading stress. Front axles are just plain big—you can't bend them! Kenworth designed, full floating rear axles are over-sized too.

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### KENWORTH 801

12 cu. yds. struck—  
14 cu. yds. heaped

18-TON



### KENWORTH 802

16 cu. yds. struck—  
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24-TON



### KENWORTH 802B

32 cu. yds. struck

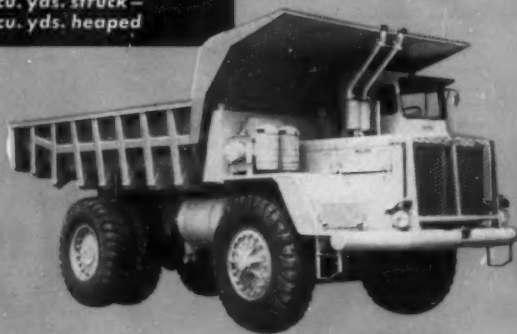
48-TON



### KENWORTH 803

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28 cu. yds. heaped

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**Holly Minerals, Inc.**, Cinnebar, Idaho, is planning to construct a new mercury plant based on research done by Washington State College Mining Experiment Station. The process involves concentration, leaching, and electrolytic deposition of mercury from the ore. High arsenic content in ore now being mined has made treatment difficult and hazardous to health by the retort method used in the past.

**American Smelting and Refining Company** has resumed underground operations at the *Morning* mine, Shoshone County, Idaho, following a fire which destroyed the 1,000-ton concentrator and some other surface plant buildings. Production, at last report, was confined to development headings and totaled about 100 tons a day. Output before the fire had been about 200 tons daily. Lead-zinc ore is being concentrated in the Golconda custom mill, pending a decision on rebuilding the Morning mill. J. C. Kieffer, is manager of ASARCO's Northwest mining department.

**Sunshine Mining Company** has contracted to deliver 1,500 tons of antimony metal, worth nearly \$1,000,000, to General Services Administration over 18 months. The metal is to be produced by means of a process developed by the company to refine the impure cathode antimony metal produced in the firm's electrolytic antimony plant. The antimony is a by-product of concentrating tetrahedrite ores mined by Sunshine in the Coeur d'Alene mining region, Shoshone County, Idaho. Current production is more than 100,000 pounds monthly, including some 35,000 pounds from treatment of a portion of the concentrates produced by the Galena mill of **American Smelting and Refining Company**. John Edgar is manager of the mining division.

Exploration of the **Silver Mountain** property east of Mullan, Shoshone County, is on a three-shift basis by **Hecla Mining Company**. Projected 3,000-foot drifts are being started easterly and westerly in the footwall of the Paymaster fault cut 1,100 feet north of the 2,000-foot deep shaft. The crosscut is being continued northward toward the Snowstorm area. William Love is manager of mines for Hecla.

The **Bunker Hill Company** is advancing a cross cut from the No. 11 level of its **Bunker Hill** mine at Kellogg, Shoshone County, Idaho to explore the old **Senator Stewart** mine now owned by **Silver Bowl, Inc.** Work is on a two-shift basis. Stanley McDougall is manager of mines for Bunker Hill.

**Idaho Custer Silver-Lead Mines Company** has rehabilitated its plant and underground facilities at the **Livingston** mine, Custer County, Idaho, and at last report was unwatering the shaft from the 2,400 level to the 2,500 level preparatory to deepening the shaft. **Hecla Mining Company** of Wallace has the contract. Alvo V. Alvensesleben of Seattle is president of Idaho Custer.

Diamond drill holes 1,000 feet deep are being drilled by **Pinnacle Exploration, Inc.**, in a preliminary exploration pro-

gram at holdings of **Uranium Mines, Inc.**, east of Mullan, Shoshone County, Idaho. Pinnacle is exploration subsidiary of **Calahan Zinc-Lead Company** and **Vulcan Silver-Lead Corporation**. Philip D. Wilson, New York consulting engineer and geologist, heads Pinnacle.

Adit exploration of a radioactive zone near **Cusick**, northern Idaho, has been started by **Clayloot Uranium Company**. Byrl Goodwin of Spokane, Washington is firm president.

A new two-stage pumping system has been installed by **Lucky Friday Silver-Lead Mines Company** east of Mullan, Shoshone County, Idaho, in connection with opening of new 2,450 and 3,050 levels. Current production is approximately 150 tons a day. Millheads have been averaging 11 percent lead and 22 ounces of silver to the ton. John A. Featherstone is general manager. Wray Featherstone has been named mining engineer and William Folwell, geologist.

**Sidney Mining Company** is the only remaining producer in the Pine Creek zinc-lead district, Shoshone County, Idaho, where about 10 mines were producing five years ago. Operations are designed for maximum production, development, and exploration with the smallest crew possible. Output has been between 4,000 and 5,000 tons monthly, with most tonnage from block-leasing operations in old upper workings. Exploration of the **Sidney** mine and the adjoining **Nevada-Stewart** property is being carried out from the bottom 2,300 level. M. C. Brown is president and Charles A. McKinley, general manager.

**Bunker Hill Company** of Kellogg, Idaho is expressing an interest in fluor-spar. A deposit in Idaho which was investigated for its lead and zinc potentials has shown indications of fluor-spar and the company is analyzing its possibilities. Company officials consider the fluor-spar

industry a good growth industry because of its relation to aluminum and steel manufacturing.

**San Francisco Chemical Company** of Montpelier, Idaho has started its new flotation plant for upgrading of phosphate ore. This is a most fundamental step in the western phosphate field and represents a completely new departure from standard processing in the west. Among some of the unique aspects of this plant are: use of impact crushers to reduce the ore from 4 mesh to 28 mesh; flotation of pulp at 28 mesh; use of screw conveyors in the flotation launders; and extensive facilities for desliming flotation feed which includes cyclones and centrifuges. The new plant, constructed at Leele, Wyoming, will also completely revolutionize mining methods. Where formerly mining, of necessity, was confined to high grade but thin phosphate horizons of 5.25 feet, bulk mining methods will now be applicable. In many cases it will be possible to mine phosphate up to 22 feet thick. The company has a multi-million ton ore body at Hot Springs, Idaho, and other properties in Wyoming, and Utah.

Talc mining operations were started recently in northern Pend Oreille County, Idaho by **Southern California Mining Company** of Los Angeles. The site is a 25-foot vein in Totem Gulch on the south side of Sullivan Mountain, discovered by Raymond and Byron Boggs of Ione. The California firm has a lease and purchase option. Charles Joy of Ogden, Utah is in charge.

**Iron Mask Mining Company** has been organized at Sandpoint, Idaho by Mary McNearney of Bonners Ferry, George W. Watt and H. R. Churchill of Sagle, R. J. Evans of Kootenai, and Robert W. Woods of Sandpoint, with capitalization of \$500,000.



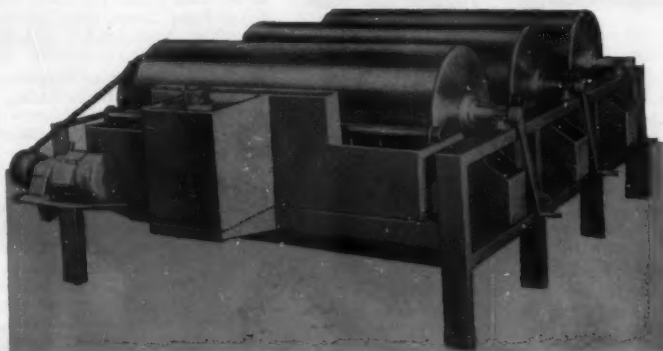
### Dawn Mining Starts Washington's First U<sub>3</sub>O<sub>8</sub> Mill

Milling is scheduled to start this month at the Dawn Mining Company's \$3,757,000 uranium processing plant at Ford, Washington. The photograph of the 400-ton mill above was taken when it was about 90 percent completed. The crushing building and ore conveyors in the foreground were then the newest additions. Ore has been trucked to the site for stockpiling over the last few months from the Midnite mine which now has 11 known uranium deposits with a value of \$14,000,000. Isbell Construction Company is stripping overburden and mining the ore by open-pit methods. According to its contract with the AEC, Dawn must accept 25 percent of its mill capacity from custom shippers if offered, and Kendrick Bay Mining Company of Alaska, a subsidiary of Climax Molybdenum Company, has an agreement to sell its ore to Dawn. Newmont Mining Corporation owns 51 percent of Dawn, and Midnite Mines, the remaining 49 percent.

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New features: Stainless nonmagnetic steel box, improved pulp distributor chamber eliminating feed shock troubles. New design is based entirely on the wellproved model used at Sydvaranger and Grängesberg and many other models in- and outside Scandinavia.

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Minas de Vila Cova, Portugal  
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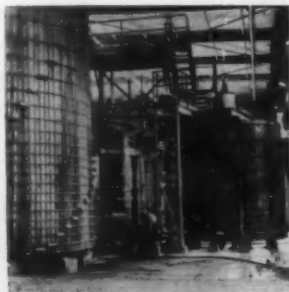
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## SOLVE ACID Problems

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With Caustics



Windeler tanks handle acid solutions economically. Pictured here are three Windeler Built Tanks in a South Dakota uranium mill handling various solutions. At the left is an ion exchange feed (highly acid, pH 1.7) holding tank, large tank at right is a slime tailing neutralization tank, and the small one in the center is a lime slurry tank.

Wood tanks also handle acetic acids to 80%, sulphuric to 5%, or hydrochloric to 5%. When planning new construction or expansion, plan on wood tanks for economy.

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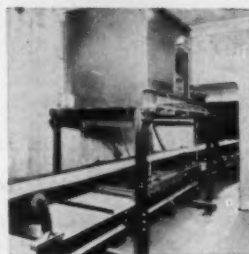
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## MONTANA

A 100-ton selective flotation mill is being installed by *St. Paul Lead Company* at the old *Snowshoe* mine near Libby, Montana. Production is scheduled to start before summer's end. *Merger Mines Corporation* of Coeur d'Alene, Idaho, has a half interest. Al Osborne is president of St. Paul Lead; C. H. Hunter of Merger.

*Western America of Montana*, subsidiary of *Alscope Explorations, Ltd.* of Edmonton, Alberta, is blocking out silver-lead-zinc ore in the *Morning-Midnight* mine at Basin, Jefferson County, Montana. T. V. Leonard of Helena is president.

Six cars of copper ore has been shipped from the Copper Flats near Silver Star by *Yellowstone Uranium Company* of Billings, Montana. Fifteen men are engaged in open-pit operations.

There are reports at this writing that *Anaconda Company* has indefinitely postponed the *Northwest Project* at Butte, Montana, and has taken other action because of low prices of copper and zinc. This means that all development work toward the *Ryan* and *Missoula* shafts has stopped, and the start of the *Ryan* shaft has been indefinitely delayed, too. Sinking of the *Missoula* shaft by *Boland Development Company* will be stopped. *Boland* may sink the *Mountain Consolidated* and *Leonard* shafts another 300 feet, and may sink two air shafts for the *Kelly* mine. All mines are also reported to be shutdown except the *Kelley*, *Leonard*, *Anselmo*, and *Emma*, and the fate of the *Anselmo* (zinc) is questionable.

*Gold Reserve Mining Company* of Bozeman has purchased 35 mining claims and five mill sites at the *Ruby Gulch* mine in the Little Rocky mountains, Phillips County, Montana, from Michael and Mary Gonderio. Company president is Delbrook Lichtenberg of Ennis. Don R. Bennett, Bozeman, is secretary-treasurer.

Further development of the *Royal* copper-lead-silver deposit in the Potomac mining district of Missoula County, Montana is planned by *U & W Uranium, Inc.* of Spokane. S. E. Salter is secretary.

Some exploratory drilling and stripping is being done by *Anschutz Drilling Company* of Denver, Colorado on 23 uranium claims in Carbon County, Montana and northern Big Horn County, Wyoming. The claims are in the Pryor Mountains on the Wyoming-Montana border.

## OREGON

The *Wah Chang Corporation* is building an addition to its new zirconium sponge plant at Albany, Oregon to provide a zirconium purification plant. *Wah Chang* also operates the zirconium plant of the U.S. Bureau of Mines at Albany,

under lease by the AEC. Output from the latter must be sold to the AEC. However, the activation of the new plant in September 1957 will enable *Wah Chang* to supply zirconium in the open market. The firm also expects to go into production of columbium and tantalum at Albany later this year.

*Arentz-Comstock Mining Venture*, operating the *Bretz* mercury mine in Malheur County, Oregon, has installed a 10-ton *Herreschoff* furnace to replace *D-retorts* which reportedly proved inadequate to handle concentrates from the 150-ton flotation plant.

Two nickeliferous laterite areas are being explored in southwestern Oregon. *Nickel Corporation of America* is drilling on *Woodcock* and *Eight Dollar* moun-

tains near Kerby, Oregon in Josephine County; *Pacific Nickel Corporation* has leased 12,000 acres at Red Flat in Curry County and is drilling there. The Oregon Department of Geology and Mineral Industries has investigated both properties in the past.

Three copper properties have made small shipments this season. The *Queen of Bronze* mine located near Takilma has been reactivated for a short time by Max Pokorney who has opened up the tunnels; the *Fort Knox* in Jackson County, owned by *Minerals and Metals Development Company* of Grants Pass; and the *Copper Bell* mine in Josephine County. The latter is operated now by Kindell B. Weir, but is owned by Fred A. Vargas and Tom Moloney.

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## NORTHWEST

WASHINGTON

*Big Smoke Uranium, Inc.* has added to its holdings in the Spokane Indian Reservation, Stevens County, Washington, by bidding \$534 for a 10-year lease on 400 acres. The land is adjacent to ground where the firm has been developing a deposit of uraninite-bearing ore. Dr. M. M. Kalez of Spokane is president.

Exploration for manganese at the *Bear Creek* mine in Clallam County, Washington is planned by *New Wellington Mines, Ltd.* of British Columbia under a \$14,880 project approved by the Defense Minerals Exploration Administration.

The eight-claim *Culver* gold property, Blewett mining district, Chelan County, Washington, has been purchased by *Great Shield Uranium Mines, Ltd.*, Calgary, Alberta, from H. W. Woodworth, Victoria, B.C. Development work is planned. William Inverarity is company manager.

*Chewelah Minerals Company* of Chewelah, Washington has filed on a mining claim in the Bossburg area, northern Stevens County.

Two test shipments of barite to an Illinois plant have been made by *Big Red Uranium Corporation* from the *Bobcat* mine on the south fork of Skookum Creek, Pend Oreille County, Washington. A crusher has been installed temporarily on a railroad siding near Usk preparatory to moving to the mine if the shipments prove profitable. Dave Maxwell is in charge.

*North Star Uranium, Inc.* has resumed exploration of the *Kessler* lease, near its *Lehmbecker* lease in the Mount Spokane district of Spokane County, Washington. The firm has an operating agreement with *Daybreak Uranium, Inc.* to explore the *Kessler*. Two cars of autunite have been shipped from the *Lehmbecker*; one shipment was made last fall and the other in January of this year. Both went to *Vitro Uranium Company's* processing plant at Salt Lake City.

A mechanical casting machine for 50-pound aluminum pigs now handles more than 20,000 pounds of molten aluminum an hour at *Kaiser Aluminum and Chemical Corporation's* Mead, Washington reduction works near Spokane. Output far exceeds the old handpouring system. Crucibles are tilted hydraulically to allow molten metal to flow down a trough and into the pig molds attached to an endless conveyor. The 1,000-pound pigs still are hand-poured.

*Western Resources, Inc.* of Spokane, Washington has named Dean Mechling, veteran Colorado plateau uranium prospector, to head an exploration program in the Spokane area. The company has leased a portion of the *Schaefer* lease, formerly held by *Daybreak Uranium, Inc.*, in the Mount Spokane district. Allen R. Campbell is vice president and general manager.

W. H. West and Ronald Frazer of Deer Park, Washington are developing an autunite showing east of Arden in Stevens County. Best radioactivity was found in a large dike.

## US Manganese Ships Test Silverton Rhodonite Ore

Vitro Corporation of America has made arrangement for the mining and grinding of about 40 tons of rhodonite from the Terry Tunnel of the Sunnyside mine in San Juan County, Colorado, according to Dr. Charles Sheer and Dr. John Holmgren Jr. of West Orange, New Jersey. After mining, the ore will be ground in the Pride of the West mill at Howardsville with the ground product being shipped in steel drums to the West Orange laboratories of Vitro Laboratories Division. Dr. Sheer will use the ore for large-scale testing in the Sheer-Korman high intensity arc process of producing metallurgical-grade manganese from rhodonite [(Mn, Fe, Ca)SiO<sub>3</sub>].

The largest known deposits of rhodonite in the United States are located in the Sunnyside, Gold Prince, Treasury Mountain area of San Juan County. In fact, rhodonite is the gangue for much of the lead-zinc-silver ore mined at the Sunnyside mine of the United States Smelting, Refining and Mining Company and is locally termed "Sunnyside pink" because of its occurrence and color.

U. S. Manganese, owned by Vitro, Sheer-Korman Associates, and Great Divide Mining and Milling Corporation, has been formed to conduct pilot plant experiments under a \$270,541 contract from General Services Administration.

Guy L. V. Emerson, president, Treasury Mountain Gold Mining Company, was one of the first to call Dr. Sheer's attention to the rhodonite in the area. He reports that the new plant in West Orange will soon be in operation.



United Western Minerals Company is conducting an intensive uranium exploration program in the Sangre de Cristo Mountains of the Westcliffe area of Colorado. The claims cover about 13,700 acres in both Saguache and Custer counties. The company has also purchased properties in the areas of Marshall Pass, Poncha Pass, Monarch Pass, and La Veta Pass and near Gunnison, Cotopaxi, Tallahassee, El Badito, and Gardner. Tom Thorne is in charge of a new field office at Westcliffe.

D. McQuaid, M. Connors, and J. Points of Ouray, Colorado have taken a lease on the London mine at Mineral Point, Colorado, and will mine it on a plan similar to a split-check. Lawrence Leach, who owns the property, reports that an 18- to 20-inch silver vein will be stripped and sorted for smelter shipment. The mill grades will be broken in the second operation and stockpiled for future shipment to a custom mill.

Red Hill Uranium Company has leased 31 unpatented mining claims located in Bull Canyon, Colorado. These claims are known as the Patty-Sunrise group and have been producing uranium ore for some time. Vanadium is also present in the ore.

The drop in lead and zinc prices has caused American Smelting and Refining Company to close its Keystone mine at Crested Butte, Colorado.

Continental Oil Company is exploring uranium claims near the crest of Rabbit Ears Pass in Grand County, Colorado. About 15,000 feet of drilling had been completed before Continental optioned the property earlier this year. The work had shown that the ore is principally autunite and schoeckingerite with some occurrences of pitchblende.

Colorado Fuel and Iron Corporation closed its limestone quarry at Monarch, Colorado recently in order to install new equipment. The usual maintenance and repair shutdown is in the winter, but was postponed until this period when better weather would permit concrete pouring operations which are preceding the equipment installation. To be installed are a new feeder, new chunk sizing apparatus, and a new conveyor belt system. Workers are now mining on a new level 600 feet above former workings. The new elevation is 11,000 feet, and it is reached over a truck road built by CF&I last fall. Limestone mined at Monarch is charged into the Pueblo plant's blast furnaces with iron ore and coke. The Monarch quarry was recently among four mines of CF&I awarded certificates of honor for outstanding safety performance. Other CF&I mines receiving the James A. Holmes certificates were the Frederick mine at Valdez, Colorado, the Allen mine near Weston, and the Sunrise iron mine at Sunrise, Wyoming.

Wayne Walling of Farmington, New Mexico and Joe Gamble of Fort Worth, Texas are opening the Auburn Tunnel near Silverton, Colorado. The mine is a former gold-silver-lead-zinc producer.

An old-time producer in the Silverton, Colorado area is being prepared for more production. Walter Bentley is reopening the Kittimac mine at the head of Minnie Gulch. A diamond drilling program was conducted on the property last year. The mine has shipped lead-copper, gold, and silver over the years.

The United States Atomic Energy Commission's Grand Junction, Colorado office is seeking graduate engineers with a minimum of four years' experience in design, construction, or operation of ore beneficiation or hydrometallurgical plants. Duties involve administration of mill contracts throughout the western United States. Annual salary range is from \$7,035 to \$10,065 per annum, depending upon qualifications and experience. Submit resumes of education, experience, and personal history to the Personnel Office, AEC, Grand Junction Operations Office, Grand Junction, Colorado.



Utah Beryllium Inc. has been formed by Gayle Cherry Leslie and the RanRex Oil & Mining Company, Inc. The new firm will mine and mill beryllium ore from deposits now owned by RanRex in the Sheeprock Mountains of western Utah. Present plans call for production of beryllium concentrate in limited quantities by the end of 1957, and installation of a permanent mill by the end of 1958.

The 1957 convention of the American Mining Congress will be held in Salt Lake City, Utah, from September 9 through 12. In addition to technical ses-

sions, there will be special field trips to Kennecott Copper Corporation's Bingham Canyon mine, the Geneva steel plant near Provo, and the Lark mine of the United States Smelting Refining & Mining Company.

The Union Carbide Nuclear Company is reported to be sinking a shaft to mine a carnotite ore body in the Summit Point area of San Juan County, Utah. Kermac Nuclear Fuels Corporation is also reported drilling a nearby carnotite discovery, this one in the Dry Valley district.

Excelsior Uranium Corporation, a subsidiary of Western Development Company of Delaware, is currently driving a crosscut to the main haulage way in its Cottonwood No. 6 claim to delineate ore in another dimension. Development adits are still being driven, too. Meanwhile, some mill shipments are being made.

Radium Hill Uranium reports good progress in its Oljato mine in Monument Valley, Utah where it has been doing development work for two years. A 360-foot inclined shaft was sunk into one of two proven ore bodies and shipments are being made from this area. A 600-foot drift has been completed directly below the main ore body and mining operations on this second ore body are getting underway.

Stockholders of Daly Mining Company have approved a merger with United Park City Mines Company. United Park City already owned a substantial part of Daly, and some of its property adjoins the Daly property in the Park City district of Utah. Consolidation will cut costs and will also allow for additional exploration.

Ogden Smelting & Refining Company is reported to have started operation of its new copper mill at Milford, Utah. U-Beca Uranium Company states that it has blocked out considerable tonnages of copper ore on its claims in this area.

Examination of an old vanadium mine is included in exploration plans of U & W Uranium, Inc. of Spokane, Washington, at its 64-claim property in the Paradox Basin. S. E. Salter is secretary.



Vitro Minerals Corporation has an option to develop and mine a number of uranium claims of Shoni Uranium Corporation in the East Gas Hills district of Wyoming. The option gives Vitro the right to explore, develop, and exploit a series of 51 claims in four groups, including the Jackneese and Blackstone claims and the Sage Hen lease, located in Fremont and Natrona counties about 60 miles east of Riverton.

Entering the central Wyoming uranium scene is Continental Oil Company, which leased 87 claims in the Green Mountain area to the east of Crooks Gap from four partners. Cash consideration was not shown, although lease terms reportedly call for the payment of \$25,000 if ore is found in exploration work and a payment of \$15,000 at the end of a year if the lease is to continue in effect.

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## ROCKY MOUNTAIN

Wyoming has been purchased for \$80,000 by two uranium operators in nearby Riverton, Wyoming from three Minnesota men. Papers covering the transaction were recorded recently at the Fremont County Courthouse. The royalty was purchased by Sam Stanbury and Vern Hughes from Sheldon Kramer, Gordon W. Fisher, and Wilbur Hayman, all of Red Wing, Minnesota.

The *Baird Division of National Lead Company* is installing a laboratory in Lovell, Wyoming to test bentonite samples from its nearby claims. The company has been doing exploration work since 1953 on the 270 claims located east of Lovell.

*Columbia-Geneva Steel Division* of the *United States Steel Corporation* has obtained an option for a right-of-way to cross the Sweetwater River with the projected railroad that will be needed if the company decides to proceed with development of its Atlantic City project near Lander in central Wyoming. The option, filed for record at Lander, was obtained from Mrs. Rachel Hay, of Rock Springs, member of a prominent, pioneer Wyoming family. The option runs until March 1958. Meanwhile, Columbia-Geneva is continuing test work on the property, including considerable drilling. It has also exercised its option to lease the property which it made with the *Ruby Company* of Boise, Idaho some time ago. The lease now extends for 75 years unless terminated sooner by Columbia-Geneva.

*Union Carbide Nuclear Company* has exercised its option on the properties of *Aljoh Mining Company* in the Gas Hills area of Wyoming. According to public records, the company paid about \$400,000 for title to the claims.

*United Western Minerals Company* has acquired options and leases on approximately 18,000 acres in the Gas Hills-Crooks Gap area of Wyoming. Drilling is to start soon. The company also acquired a large acreage of undeveloped mineral leases and mining claims in the Baggs area of Wyoming. An office has now been opened at Riverton.

The *Wyoming Public Service Commission* has approved issuance of \$575,000 in notes by the Hot Springs County REA to finance lines and other facilities to provide electric power to Wyoming's two uranium mills, now under construction in the Gas Hills and Sweetwater (near Crooks Gap) areas in Fremont County by *Lucky Mc-Utah Construction Company* and *Western Nuclear Corporation* (formerly *Lost Creek Oil & Uranium Corporation*).

A special Uranium Committee has been named by the *Wyoming Mining Association*, with H. D. Hand, of Casper, as chairman. "The committee has been named to give special consideration to problems which are of primary concern to the uranium industry."

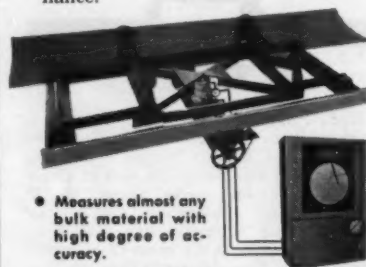
The *Board of Fremont County Commissioners* is asking the *Atomic Energy Commission* to oil the 54-mile uranium access road from a point near Riverton to the Gas Hills in central Wyoming. The board claims the county cannot afford to maintain the road at an estimated cost of \$100 per day, especially in light of what it calls "inadequate" gravel surfacing. The road was recently completed under a contract with the Bureau of Public Roads, which has already notified the Commissioners it does not have funds to oil the road.

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During the two-week shutdown last month at *Calumet & Hecla Inc.*'s Michigan operations, the following maintenance projects were undertaken: the smokestack at the *Seneca* mine was replaced; two sheave stands at *Centennial No. 2* were replaced; a new casting wheel was installed in No. 20 furnace at the smelter; and rock bins at the *Ahmeek* mill were repaired. The shaft at the *Seneca* is being timbered to the 31st level. The bottom had been the 30th, where a drift is being driven north. Drifting is also underway on the 28th and 29th levels to the south. At the *Centennial No. 2* an exploration drift is being driven to the south on 37 level. It will continue for a mile, and a previously unworked area on the *Kearsarge Lode* below No. 20 shaft will be explored. Two exploration drifts have already been driven to the south from the *Centennial No. 2* on the 23 and 48 levels. Production has started on the *Allouez* conglomerate in the *Allouez* mine.

*Hydrometals Inc.* of Chicago, Illinois is planning to build a plant in Illinois for the commercial production of high purity copper powder by a chemical process of leaching and gaseous reduction developed by the *Chemetals Corporation*, as licensee under *American Cyanamid Company* patents. This is the initial project in the company's program for using its exclusive rights to build such plants in various areas of the United States. Specifications for the construction of the first plant have been submitted by the *Fluor Corporation Ltd.* of Los Angeles and *E. W. Bliss Company* of Canton, Ohio.

New research and development laboratories, pilot plants, and test and production facilities are being built by *Olin Mathieson Chemical Corporation* at its *Ordill* works near Marion, Illinois, as part of a four-year expansion program for the development and production of high-energy solid propellants for rocket engines.

The board of directors of *Michigan Chemical Corporation* of St. Louis, Michigan has authorized its management to finalize engineering studies and plant design of a sea-water magnesium-oxide plant at a point on the Gulf Coast. Management has also been authorized to proceed with optioning of several sites.

*American Zinc, Lead & Smelting Company* has closed its zinc and lead *Nellie B* mine at Picher, Oklahoma for "an indefinite period," and has been considering shutting down one of its five retort smelting operations. The drop in the price of zinc has been responsible. The *Nellie B* has been operating on a "clean-up" basis for over a year, with underground work handled by former employees on a profit-sharing arrangement.

Governor Orville Freeman has signed into law a bill extending the state of Minnesota's taconite leases for an additional 25 years. In authorizing the bill, the Governor expressed the belief that the new law would "undoubtedly expedite new expansion plans and construction programs in the entire taconite fields."

The act authorizes the conservation commissioner of the state, with the approval of the executive council, to extend leases under terms and conditions that will be negotiated between the owners of the leases and the commissioner.



The *New Jersey Zinc Company* will receive \$52,975 from the DMEA for zinc exploration in Grainger County, Tennessee. The firm will spend an equal amount on the project.

*Gatling Mining & Development* of Camden, New Jersey is starting development of its uranium prospect located at the *Raven Rock* quarry in Hunterdon County, 15 miles north of Trenton. Samples taken have had a high uranium oxide content. The AEC has granted the firm a license to ship 50,000 tons of ore from the area during the next 12 months.

*Reading Metals Refining Corporation*, a subsidiary of *Reading Tube Corporation*, should start operation of its new \$4,000,000 copper refinery sometime this summer. The refinery is located in Ontelaunee Township, Pennsylvania, and is said to be the first copper refinery to be built in the eastern sector of the nation in 55 years. It will electrolytically process scrap or blister copper to form billets of over 99.95 percent purity. Its capacity will be about 1,200 tons of copper monthly.

Peter Joralemon, a consulting geologist of San Francisco, California, has recently made a zinc evaluation survey and report of the *Embreeville*, Tennessee properties for *Tri-Cities Zinc Company*. The mine is best known as the *Appalachian* zinc mine and has produced over 200,000 tons of zinc from oxide ores. Mining for iron started there over 150 years ago. Lead and manganese have also been mined on a large scale. The property is now held by *Tri-Cities Zinc*, headed by T. K. Li. *Haile Mines* is leasing part of the property for manganese production.

*Woodward Iron Company* is operating at capacity at Birmingham, Alabama after a 162-day strike. The company is also proceeding with mechanization of coal and iron ore mining operations, and is planning to construct a sintering plant for processing of fine ore and flue dust. A proposed \$2,000,000 development of the firm's ore reserves near Wildwood, Alabama were postponed by the purchase of the *Muscoda* properties from *Tennessee Coal & Iron Division* of *U.S. Steel Corporation*.

The *Lead Industries Association* has authorized *Battelle Memorial Institute* of Columbus, Ohio to undertake a study of "Evaluation of Research Needs and Formulation of a Research Program" for the lead industry. The object is to provide a guide for future research to be undertaken by the Association. *Battelle* will screen and evaluate possible research approaches, and will formulate a balanced program based on these findings. Particular emphasis will be placed on new industrial uses for lead, its compounds and alloys, as well as on developing new lead products. Final results are expected by the end of the year.

The Annual Meeting of the *Society of Mining Engineers* and the *Southeastern States Mining Conference* will be held October 15, 16, 17, and 18 in Tampa, Florida. Highlighting four days of technical sessions and field trips will be a tour through the bone valley phosphate mining field and processing centers adjacent to both Tampa and the citrus growing highlands. The trips to the phosphate field will include visits at the *Norilyn* mine and flotation plant of *International Minerals & Chemical Corporation*, the triple superphosphate plant of *Davison Chemical Company*, and a phosphorus furnace operation. Other events are also being planned. Host for the meetings will be the Florida section of the *AIME*. Advance registration may be made through B. P. Jones, *Davison Chemical Company*, Bartow, Florida.

*Wah Chang Corporation* has revealed that it has a new process for treating tungsten ores. This was announced at the dedication of the *Loung Building* at *Glen Cove*, New York where the new facility is capable of treating up to 2,000,000 pounds of tungsten concentrate monthly with this method. The process produces the finished product directly from the ore in a continuous operation. The ore is charged into one end of the system and discharged as pure tungsten crystals at the other end.

As of July 1, the *United States Mica Purchasing Depot* in Spruce Pine, North Carolina is under the jurisdiction of Region 3 in Washington instead of Region 4 out of Atlanta, Georgia. This is not expected to affect operations of the depot.

The Chicago office of the General Services Administration has been receiving bids for purchase of the *Diamond* magnesium plant in Painesville, Ohio. Two bids have been submitted at time of this writing—*Wheeler Chemical Corporation* and *Kaiser Aluminum and Chemical Corporation*. The *Diamond* plant was built in 1942 and operated by the *Diamond Alkali Company* for two years during the war, and then again from June 1951 to June 1953. It is now in a standby condition. The plant has an annual capacity of 17,000 tons of magnesium.

*Olin Mathieson Chemical Corporation* has filed an option on a 200-acre tract of land near Montville, Connecticut, as a possible site for a small plant for assembly of nuclear reactor core. The site is one of several under consideration by the company's Nuclear Fuels Division. The company has a pilot plant in operation at the site of firm's *Winchester-Western* Division in New Haven, and is seeking a suitable location for a larger plant.

*Metallurgical Resources Inc.* reports that it has received foreign patents on the *Sill* process for treating cobalt concentrates. Patents already have been issued in Belgian Congo, Rhodesia, Belgium, and Canada, with 10 more pending in other parts of the world. The firm will use the patent in its Newburgh, New York plant.



*Jones & Laughlin Steel Corporation* has placed its new *Humphreys* spiral and

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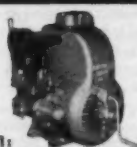
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**AC2:**  
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**WC1:**  
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**WC2:**  
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type, 4-cycle, 15 BHP @ 1800 RPM



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froth flotation sections in operation at the Arthur retreat plant at Calumet, Minnesota. The spiral section was started first and the forth flotation section was placed in production two weeks later. This is the first plant of its type to be used on the Mesaba Iron Range, and will undoubtedly influence the future treatment of fine iron tailings. Feed to the plant is pumped by hydraulic dredge to a 70-foot thickener which is used as a feeder and surge bin. The feed rate to the plant amounts to about 130 long tons per hour of fine tailings from the Hill Annex tailings basin.

*Inland Steel Company* is preparing a new production shaft which will serve its No. 2 *Armour* iron ore property in Crosby, Minnesota. The new shaft will eventually be the center of Inland's iron mining on the Cuyuna Iron Range since the lease on the presently producing *Armour No. 1* shaft mine will expire on June 1, 1959. The latter has been a consistent producer for Inland since it was opened in 1912. The new shaft will have two skips and a cage. A drift from the air-pump shaft on No. 2 property has been driven from the 348-foot level to connect with the vertical center line of the new shaft. Here, cutting of the rock will start by sinking and raising simultaneously; this will continue throughout the shaft sinking procedure. Ultimate depth is to be over 500 feet.

The huge 30-cubic-yard dragline of the *M. A. Hanna Company* which was moved four miles cross-country to the *Norpac* site a few months ago from the *Morton* mine just west of Hibbing, Minnesota, is currently employed in earth removal and casting into 34-ton mine trucks. The trucks are now carrying this stripping material to be used to build roads and to make fill for the conveyor belt line and stacker base. Subsequently, the dragline will be loading dirt and rock overburden into its regular mobile loading pocket and screening plant which, in turn, will discharge onto a conveyor belt system. The conveyors will carry the material to a stockpile area east of Hibbing—just short of three miles away. The *Norpac* mine is expected to be producing iron ore in 1959.

At its recent Annual Meeting, the membership of the *Lake Superior Iron Ore Association* voted to change the organization's name to the *American Iron Ore Association*. The new name recognizes the geographical shifts in the sources of iron ore which have been taking place over the last 10 years. For many years, the Lake Superior mines supplied the bulk of the ore used in the United States. Today, however, the industry is spread out over the United States and Canada.

Men of *United States Steel Corporation's* *Oliver Iron Mining Division* placed the traditional pine tree on a very special carload of iron ore recently. It was the first carload from the newly reactivated *Stephens* mine, three miles northeast of Aurora, Minnesota. The pine tree ceremony is usually reserved for a new mine's first shipment, but the *Stephens* seems new enough with 47,000,000 tons of ore estimated to be there. Only 454,819 tons had been shipped out previously and that was between 1903 and 1905. To prepare the mine for recent production, it was necessary to divert a stream and install extensive mine facilities. In addition to a truck pocket and a crushing and screening plant, installations

were made to provide shipping pockets, conveying equipment, maintenance facilities, power distribution system, and a water supply and sewage system. Eleven miles of railroad track was constructed by the *Duluth, Missabe and Iron Range Railway* to provide adequate storage yards and connection to their present transportation system. Present scheduling calls for 2,600,000 tons of ore to be mined this year and 3,500,000 tons next year. Ore will be carried out of the mine by truck, unloaded into a dump pocket, processed in a crushing and screening plant which has been erected by the American Bridge Division solely to handle *Stephens* ore. Ore that does not fall through the 6-inch screens will be broken into pieces no larger than 6

inches by a 48-inch by 60-inch jaw crusher. The crushed ore will then join the fine ore on the main conveyor belt and be carried to the railroad loading pocket.

The *Mahoning plant* of *Pickands Mather & Co.* located northwest of Hibbing, Minnesota, commenced operation in mid-June. This plant consists of a heavy media section, HMS cyclone section, and a Humphrey spiral section, in addition to straight washing and direct ore loading facilities. The design tonnage of the plant is 600 gross tons per hour. The conventional heavy media section was moved from the *Biwabik* plant of *Pickands Mather*, while the HMS cyclone and Humphrey spiral sections are new installations.

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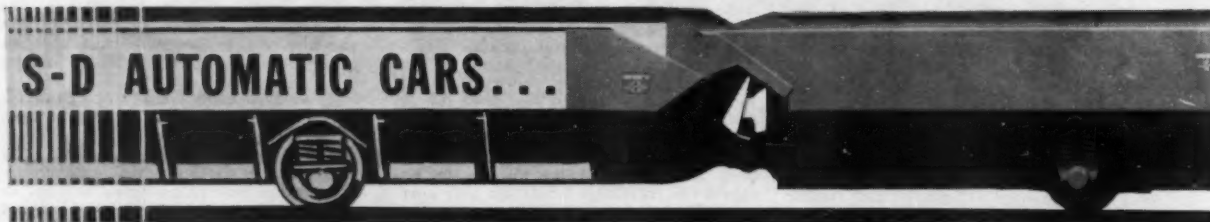
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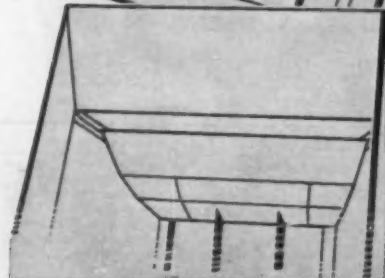
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Pictured below is a trip of S-D "Automatics" with Overlapping Ends in actual operation. The car above (and further illustrated at right and left) is one recently ordered by a large company. It is 7' in width, 44" high, 20' center-to-center of couplers with an inside body length of 16½ feet. It further features spring mounted trucks and automatic couplers.



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ARIZONA

*Bagdad Copper Corporation*, Bagdad, Arizona, has announced its plans to increase the output of its mill from the present capacity of 3,500 to 4,000 tons per day to 10,000 tons per day as soon as possible. The company's pilot plant for the production of electrolytic copper is said to be operating satisfactorily and regularly producing about 3,000 pounds of electrolytic copper a day, its normal capacity. The sulphuric acid, a byproduct of the electrolytic process, is used to produce cement copper from one of the oxide copper ore dumps and last year about 25 tons of cement copper were produced by this means. During 1956, Bagdad's main activity was the stripping of the ore body, which required the removal of 12,765,350 tons of overburden, or 10 tons of overburden for each ton of ore milled. Eventually, the ratio of overburden to ore is expected to be two and one-half to one, instead of 10 to one. When the electrolytic plant is finally completed, it is expected that the sulphuric acid produced by the electrolysis of two pounds of copper in the electrolytic plant will make possible the recovery of one pound of copper from the oxide ore dumps.

Controlling interest in *Ambrosia Min-*

*erals Company* has been acquired by Paul E. McDaniel of Houston, Texas. Ambrosia has manganese mining and milling interests near Wickenburg and Aguila, Arizona, and in New Mexico. Recently, the main office was moved from Albuquerque, New Mexico, to the First National Bank Building, Phoenix, Arizona. The oil department of the company, McDaniel said, is to be expanded and moved to Houston in July.

*San Manuel Copper Corporation*, San Manuel, Arizona, has awarded the contract for the erection of 50 additional residences and a dormitory to provide additional housing for employees. The contract went to *E. L. Farmer Construction Company* for a bid of \$516,000.

The *Roxy Enterprises*, Lewis Sirota, president, has acquired a lease and purchase option on the old *Pittsburgh* mine, a part of the *Warsaw* group, located near Ruby, Arizona. A crew of five men is employed building an ore bin and in preliminary work for mill construction. Plans call for a straight flotation plant with a daily capacity of 75 to 100 tons. Irving Birkenblatt of Arivaca is general manager.

*Miami Copper Company*, Miami, Arizona, has announced production cuts at its *Miami* and *Copper Cities* divisions. Effective July 15, both properties went on a five-day week, instead of the previous six-day week. General Manager V. R. Coil stated the cutback is the result of an "excessive accumulation of unsold copper," and will amount to a 20 percent reduction in copper output.

About 1,400 employees are affected by the reduction in the work schedule, but no layoffs are planned at the present time.

The old *Butternut* copper mine in the Big Bug district near Humboldt, Arizona is under option to *International Ranwick, Ltd.* which examined some 26 prospects in the United States last year before acquiring this. The company is also drilling at Copper Basin near Prescott where indicated reserves are more than 14,000,000 tons; 4,000,000 tons of this reserve is said to average 0.913 percent copper and 0.124 percent molybdenite.

The *U.S. Atomic Energy Commission's* ore buying station near Globe, Arizona has been discontinued. Ore production and ore reserves did not indicate any reasonable prospects for an economic milling operation, and no private company had shown any interest in constructing a mill.

Land in the vicinity of the Glen Canyon dam site in northern Arizona has been closed to mineral entry, except for uranium, according to an order issued by the Department of Interior. Secretary of the Interior Seaton stated that a 1954 land order opening 160,050 acres of land in that area to mineral entry had been withdrawn. The reason for the withdrawal, the announcement said, was the construction activities in connection with the erection of the Glen Canyon Dam.

CALIFORNIA

Robert A. Mindte of Bellflower, California is exploring claims in the Bear Lake area of San Bernardino County. He found mineralization there several years ago and staked 21 claims on 400 acres. Assays of pegmatitic uranophane have ranged from 0.60 to 30.0 percent uranium oxide.

*Kern Uranium Company* is continuing underground development at its property in Kern River Canyon, Kern County, California. A 60-foot shaft has been sunk, offsetting the vein which dips from 75 to 80°. Some crosscutting has been done and samples from the vein are being assayed.

Two new reports are available from the California Division of Mines in San Francisco on the geology of Mono and Inyo counties.

*American Western Metals* plans to develop the *Harrison* quicksilver mine located in the Knoxville district on the boundaries of Yolo and Napa counties, California which it now has under lease. The firm has a DMEA loan for core drilling.

A group of Utah business men headed by former Utah governor J. Bracken Lee are reported to have formed *Seiad Chrome Inc.* The firm will develop chromite leases it holds in Scott River mining district of Siskiyou County, California.

*American Potash & Chemical Corporation* is doubling the production capacity of granular potash at its plant in Trona, California. The project will cost \$750,000, and is part of the company's current \$3,500,000 improvement program at Trona.



## Kennecott Plans \$1,500,000 Skip Haulage System

A new \$1,500,000 skip haulage system for removal of ore and waste from the huge Liberty Pit (pictured above) is being installed by the Nevada Mines Division of Kennecott Copper Corporation. The installation is designed to improve operating efficiencies, increase production, and help the division to remain competitive in the copper mining industry. It is scheduled for completion in the second quarter of 1958. The new hoist or skip installation will consist of two parallel tracks running down the side of the pit to the bottom. On each of these tracks will be mounted a 35-ton ore carrier which will work in balance—that is, one will be hoisted while the other is being lowered. At the edge of the pit will be a structure similar to the head frame of an underground mine, which will contain the bins from which ore will be loaded into railroad cars for transportation to the reduction plant at McGill, Nevada. Behind the head frame will be the customary hoist house containing the large motor driven hoists capable of raising the 35-ton loads of ore and waste. It is planned to install three ore loading points at various elevations along the tracks so that truck haulage units can most effectively dump the ore and waste into the skips for elevation to the pit rim. The installation will make extensive fringe ores on the perimeter of the Liberty Pit available to open pit mining methods. Necessary stripping of overburden to recover the fringe ores will be started simultaneously with progress on installation of the skip system. Total excavation, which will be accomplished by Kennecott equipment, will require the removal of 2,000,000 tons of earth.

## NEVADA

A new car dumper cradle has been installed in the mill by *Kennecott Copper Corporation's Nevada Mines Division*. The firm reports that during the first five months of 1957 the average daily tonnage through the mill was 21,750 tons, 12,814 tons of which came from Kennecott mines and 8,936 tons from *Consolidated Coppermines'* output.

*Apex Uranium Inc.* of Austin, Nevada has purchased a 300-ton-per-day tungsten mill which it plans to convert to uranium processing if the AEC approves. A new carbonate leach circuit would be installed, but existing bins, building, grinding and classifying units would be used. At the Apex mine, about 3,000 tons have been stockpiled. Indicated reserves are now 370,000 tons. The firm is also interested in the *Low Boy* claims about six air miles away.

The *Anaconda Company* has made a 16 percent cutback in production of copper at its *Yerington* mines at Weed Heights, Nevada. The curtailment of 416 tons a month is an effort to bring current oversupply of the metal into closer relationship with demand. The reduction will be achieved through a cut to a five-day week from the regular six-day schedule.

*Combined Metals Reduction Company* has announced closing of its lead-zinc mines in the Pioche district of Nevada unless there is an improvement in prices of the two metals.

V. C. Segers, Leonard Distefano, Robert M. Durrin, and John Smith, all of Ruth, Nevada, and Jack Roland of Oklahoma City are reported to have found zirconium near Ely, Nevada. Fourteen placer claims have been filed in White Pine County courthouse.

Three engineers of the *United States Geological Survey* are surveying the area from Battle Mountain, Nevada to Palisade, and into Pine Valley, covering about 1,000 square miles. The survey is in preparation for an accurate topographic map of the area which will be available in about two years after the survey is completed.

The Humboldt County, Nevada Sheriff recently sold two patented mining claims of the *Winnemucca Mountain Mines Company* at public auction. Purchaser was O. R. Maunela for \$2,448.55.

Jim Bradshaw, George Rowe, and Ernest Hemdley, all of Caliente, Nevada, are reported to have made a gold strike near the old *Delamar* gold mine 32 miles southwest of Caliente. The men have had a six-year lease on the property since 1954.

Development of a laboratory method for successfully electro-refining titanium has been announced by the U.S. Bureau of Mines. Various cells and electrolytes were developed and tested at the Bureau's station in Boulder City, Nevada. The study is continuing.

A centennial celebration is planned for Virginia City, Nevada in 1959. Silver was discovered in the Comstock Lode in 1859. A committee on representative Ne-

vada citizens has been appointed to arrange for the celebration.

## NEW MEXICO

*Calumet & Hecla, Inc.'s* Calumet Division has awarded a contract to the *Banex Company, Inc.* of Albuquerque, for erection of a surface plant for a new uranium mine near Grants, New Mexico. Mining of the 500,000-ton ore body will be through an inclined haulageway 2,200 feet long, consisting of 1,600 feet of straight incline at a 10 percent grade and 600 feet of curved incline at an 8 percent grade. The ore will be trucked directly to surface with Diesel powered trucks. Full production is to be reached early in 1958. The initial ore body to be developed represents exploration results to date on a small portion of the land under company control at the New Mexico location. Continued drilling by

Calumet & Hecla is increasing company reserves in the area, as well as extending limits of the present ore body. The surface plant as presently planned will have a capacity of approximately 500 tons of ore per day, according to Horace Y. Bassett, Calumet & Hecla president. Actual volume at the outset will be governed by the capacity of nearby mills to treat the ore.

More than \$500,000 will be spent in the remainder of this year on exploration of a block of uranium claims in the Ambrosia Lake area of New Mexico owned by *Yucca Mining & Petroleum Company Inc.* Financing for the *San Mateo Dome Project*, as this will be known, will come from the *Lisbon Uranium Corporation*, controlled by *Atlas Corporation*, and from *Mineral Project-Venture B Ltd.*, a limited partnership of eastern inventors with headquarters in Madison, New Jersey. *E. J. Longyear Company* will manage the exploration program which covers about 16,000 acres in T. 13 and 14 N, R. 8 and 9 W., McKinley County, New Mexico.

Mineral Map of Flagstaff, Arizona has just released the first four maps in its

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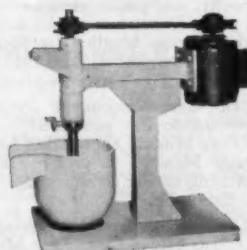
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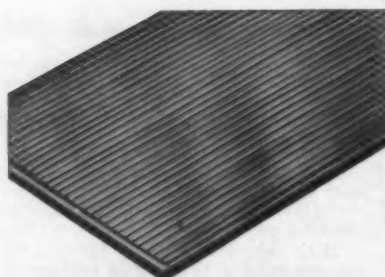


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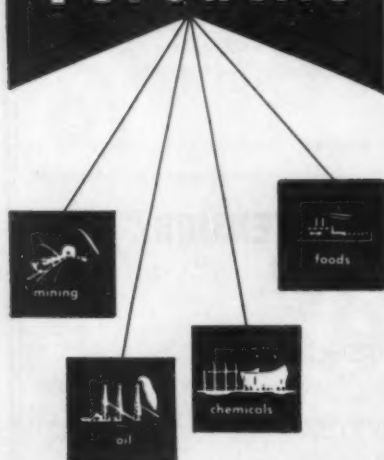


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## SOUTHWEST

Grants Township (New Mexico) series. Now available are maps for T. 13 N., R. 8 W.; T. 13 N., R. 9 W.; T. 13 N., R. 10 W.; and T. 13 N., R. 11 W. These cover the Grants uranium district from Prewitt to San Mateo across ore bodies including those of the *Haystack*, *Poison Canyon*, and *Calumet* areas. These critical maps of the district will suggest exploration targets. They feature completely original geological mapping. All shafts and significant access roads to April 1957 are included. The scale is 1:24000, showing latest USBLM section grid surveys. Thomas W. Mitcham, mining geologist, was retained as consultant.

During the week of June 3 through 8, 90 feet of shaft (from 515 to 605 feet) were sunk and lined by *McKenzie and Whittle* at the potash property of the *Farm of Chemical Resources Development Corporation* near Carlsbad, New Mexico. The contractors claim this is a record sinking. The number one shaft is scheduled to go to a depth of 1,700 feet. Operation is planned for next year.

Two firms in the Carlsbad, New Mexico potash district have begun expansion programs to increase production of granular products. *Potash Company of America* has almost finished a new \$1,000,000 granular plant which will use a new refining method which takes ore directly from the mine, crushes it, and then screens the fines. The uniform pieces which remain will be processed in a series of reagents. A second new plant is now under construction. This will be located at the north end of the drier building and will use still another method for making a granular product. Called the *Compaction Method*, it will use giant compressing machines which will put refined potash under tremendous pressure to cause it to form large sheets, which will then be ground and sized. Both plants are being constructed by *Stearns-Roger Manufacturing Company* and completion is set for late summer. Also increasing its granular capacity is *International Minerals & Chemical Corporation* near Carlsbad, New Mexico. Largest item in its program is the installation of screens at the delivery end of the dryers, together with conveyors and elevators. All nuriate production will feed from the dryers through the screens and will be sized. All fines will be removed from the production and will be used as feed for the chemical plant where potassium sulfate and pure grade of potassium chloride are produced. Several other revisions and additions will be made to the granular plant at the same time, and additional loading and improved bagging facilities will be installed. Revisions will also be made in the dryers to increase their capacity, and minor changes in the crushing plant. Construction and installation work is being handled by *Stearns-Roger* with completion also set for September.

The *New Mexico Economic Development Commission* has published a new study of "Clay Mineral Potential of North-eastern New Mexico." Copies are available by writing to the commission at PO Box 706, Santa Fe.

*Peru Mining Company* has closed its zinc mine near Silver City, New Mexico and its processing mill at Deming. The low price of zinc was cited as cause for the shutdown. *American Smelting and Refining Company* and *Empire Zinc Division of New Jersey Zinc Company* with properties in the Silver City area, said

they would not curtail work for the time being and had hopes that the market would readjust satisfactorily.

*Copper Chief Mines, Inc.* of Magdalena, New Mexico has opened up a perlite mine about six miles from town. This is the second in Socorro County, and the fourth in the state. T. B. Smith is in charge of operations.



*American Smelting and Refining Company* has reduced production of Special High Grade Zinc at its Corpus Christi, Texas smelter by 30 percent. The cutback will be accomplished by suspending shipments of zinc fume from the company's smelter at Chihuahua, Mexico. The 2,700-ton monthly reduction amounts to about 8 percent of the United States total. By reducing mining and smelting operation, ASRCO will eventually cut its own output by nearly 30 percent.

More and more fluorspar appears to be entering the United States from Mexico via the border towns of Brownsville, Eagle Pass, Del Rio, Marathon, and Presidio. Most of the ore is coming from the Coahuila district. Some companies have mines in Mexico; others purchase from Mexican operators and import the ore across the border. Among the producers are *Flurita de Mexico S.A.* of Muzquiz, *Oscar Gonzales* of Ciudad Acuna and *John Hardy* of Del Rio; The *Mexican-American Mining Company* near Ojinaga. Doing business at the railhead of Marathon are *Bailey Fluorspar Company*, *Delhi*, *Brewster County Fluorspar Company*; and *Continental Ore Company*. *Reynolds Aluminum Company* is shipping in bond through Marathon. *Dow Chemical Company* is said to be making a study of both Marathon and Del Rio with the idea of establishing a concentrating plant there. They have a mine near Pico Etereo.

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## INTERNATIONAL NEWS

### New Zealand Interest Aroused in Black Sand Beaches and Power Producing Wairakei Steam

The future mining potential of New Zealand was investigated with great interest by one of MINING WORLD's correspondents, who recently made an extended tour of the islands. He found the general terrain to be much like Japan, although less mountainous, and rocky outcrops to be infrequent and small.

An active interest in rutile and ilmenite has spread to the islands. Many black sand beaches have long been known, but there are also many beaches with small concentrations of heavy mineral which, if containing a reasonable proportion of rutile, will be of economic interest. Six prospecting licenses from Waiki Beach to Bowentown and one license for the fore-shore of Matakana Island have just been issued. Waiki is the location of the now defunct Martha gold mine (first in the world to use the cyanide process), and is to the east of Coromandel Peninsula, east of Auckland. Approximately 30,000 acres are the subject of prospecting license applications.

The production of 250,000 kilowatts of power from steam and hot water in the Wairakei geothermal area is recommended in a recently released New Zealand government report. The cost is estimated at £21,680,000, and it is further recommended that the work be done in three stages. The first stage of 69,000 kilowatts is already in operation; the next is to be 82,400 kilowatts; and the third would be for 101,200 kilowatts. The total is one quarter of the country's present hydro-electric power generating capacity. At the present rate of well sinking, proved resources of geothermal power should reach 250,000 kilowatts next year.

MINING WORLD's correspondent visited geothermal drilling operations at Wairakei, and found it very interesting. The only other geothermal steam plant in the world is in Italy, and Wairakei does not have the Italian problem of gases in the steam.

There is a thermal area in the North Island of New Zealand roughly 150 miles by three miles. It represents a huge fault and there are lesser faults within it. From aerial surveys suitable faults are found and, if the ground is satisfactory for drilling, holes are put down, using a small oil drilling rig with special safety precautions. Drilling eventually intersects faults at various depths, but mostly at 2,000 feet.

Several holes were viewed. Each with 8,000 horsepower of steam belching out. A hole is estimated to produce steam for 20 years. Steam is thought to be from surface water percolating down to hot areas. A large lake, Taupo, is near Wairakei, but there are many such favorable areas for "steam mining." Experimentally, holes have been sunk 10 feet apart without affecting one another's steam supply.

As for deep mineral deposits in the islands, they might exist in satisfactory quantities but would be hard to find because of the abundance of vegetation, the soil cover, and the lack of interest in mining by local residents in this chiefly agricultural country.

The itinerary of MINING WORLD's correspondent also included a mercury mine at Puhī Puhī, which produced 35 tons of mercury from 0.3 percent ore (cinnabar) during the war, but now is inactive. There is still some ore in the deposit, but

the grade is low. A large deposit of siliceous rock with a very low cinnabar content has also been found nearby.

### PM Drills and Evaluates Canadian Javelin Iron

The new firm of Wabush Iron Company, Ltd., formed by Pickands Mather & Co. and The Steel Company of Canada, Ltd., has signed a lease agreement with Canadian Javelin Ltd. to develop a five-square-mile area within a 4,700-square-mile concession which Canadian Javelin holds from the Newfoundland and Labrador Corporation. The latter, in turn, has the concession from the province of Newfoundland.

Pickands Mather and The Steel Company (Stelco) had been exploring for iron ore in Canada for about five years. They currently hold a large number of Canadian leases and mining claims.

Canadian Javelin has done partial exploration, drilling, and some test pitting of the property. Government estimates place the amount of ore at 1,100,000,000 tons of crude. There is magnetite, hematite, and specularite in the area.

At the present time, there are no definite plans for an actual concentrating plant. This summer, PM plans to proceed with exploration, testing and planning using drill rigs and other equipment to drill the area thoroughly, define the limits of the ore body as much as possible, and determine its analysis and concentrating characteristics. Studies will proceed on possible plant development, transportation and power facilities, townsite and other factors essential to commercial development on a substantial scale of the entire property.

Until the ore body is thoroughly explored, the ore analyzed and tested, and drawings for a proposed plant and auxiliary facilities made, no authentic company statement will be made as to the size or nature of any project of the PM-Stelco group or whether the property will be developed. Additional factors are (1) economic conditions at the time a project is started and (2) needs of the steel companies which will be the owners. It is thought that a plant of less than 2,500,000 tons annual production would not be economical, considering the cost of preliminary work, railroad development, etc. An operation would include a processing plant, a townsite, the railroad, dock, and power facilities. Mining would be done by the open-pit method.

### Sicily Potash Reserves Undergoing Exploration

Potash salts have been known to exist for several years in Sicily, but only in the last three years has any systematic exploration work been done. The Montecatini Company and the Edison Company have been investigating seven individual deposits: Racalmuto; Bosco San Cataldo; Santa Caterina; Salinella; Sambuco-Casazze; Capodarso-Scioltabino; Mandre-Villadoro.

These deposits are in a sedimentary basin which is about 70 miles long, from Cattolica Eraclea to Agira, and averages 12 miles in width. The potash-bearing

layers are found within masses of bedded salt (NaCl), several hundred yards thick. The salt formation is covered by upper Miocene gypsum and marls, usually highly disturbed. Below the salts, gypsum, limestones (sometimes sulphur-bearing), radiolarian oozes, and marls of Miocene age are commonly found.

The prevailing potash mineral is kainite [ $\text{KM}_2(\text{SO}_4)\text{Cl} \cdot 3\text{H}_2\text{O}$ ]. Beds of this mineral are found up to 65 feet thick, with maximum grades up to 18 percent  $\text{K}_2\text{O}$ . In some of the basins, layers of carnallite ( $\text{KM}_2\text{Cl}_2 \cdot 6\text{H}_2\text{O}$ ) and of magnesium sulfates are found, with grades up to 13 percent  $\text{K}_2\text{O}$  and thicknesses up to 14 feet. These layers are interbedded within the kainite deposits. The maximum depth of the explored formations is 2,500 feet; however, layers of commercial interest are sometimes found above 1,000 feet. Strike and dip of the layers are quite different throughout the entire area, but remain rather uniform within each single deposit.

A final evaluation of existing ore reserves is not yet possible, but there is believed to be 200,000,000 tons of mineable ore above 12 percent  $\text{K}_2\text{O}$ . Exploration for potash in Sicily continues and it is quite possible that other deposits will be found. Early start of production is planned for many of the deposits. The present production program totals 150,000 tons of  $\text{K}_2\text{O}$  per year, mainly turned out as sulfates and chlorides for the fertilizer industry.

### Blind River Area Called Valuable Thorium Source

The Blind River area of Ontario, Canada, known for its valuable reserves of uranium ore, is now also considered one of the most important potential sources of thorium on the North American continent.

According to David F. Shaw, assistant general manager for manufacturing, United States Atomic Energy Commission Uranium Institute of America, "On the basis of present knowledge, in the ore bodies now being developed, the average thorium content of the ore beds appears to be on the order of one part thorium to two parts uranium. Using these figures at the projected rate of about 10,000 tons of  $\text{U}_3\text{O}_8$  production annually from this area by 1959, the potential thorium output might be on the order of four to five thousand tons of  $\text{ThO}_2$  per year, which is probably at least ten times present world production."

He went on to say, "Although studies of the economics of recovery are underway, no attempt is being made to recover this thorium at the present time. There is little reason to doubt that economic extraction of this thorium could be achieved, when and if there is a sufficient demand."

Although the long-run prospects of thorium appear excellent, technical obstacles to its use must first be overcome, and these make widespread use of thorium in the near future a much less likely possibility than is the case with uranium. The use of thorium will always be influenced by the availability and price of the competitive nuclear material, uranium; if uranium is cheap and abundant, strong economic incentives to use thorium in reactors will be lacking.

The AEC's requirements for thorium have been met by purchases of byproduct thorium salts supplied by processors of



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monazite sands. The stockpile goal will be largely fulfilled by the end of 1957 from contracts entered into several years ago. No new contracts have been entered into since 1955, and no further purchase program for thorium is at present contemplated.

### China's 5-Year Plan Sets High Metal Output Goals

Production figures from behind the Bamboo Curtain are almost impossible to obtain. Information filtering out has made it possible to estimate current output, however, and progress being made in the Chinese mining industry.

The current Five Year Plan calls for expansion in all metals. Using an index of 100 for 1952, 1957 goals are estimated as follows: copper 170; lead 330;

zinc 310; wolframite 150. More specifically, China's production of electrolytic copper was estimated at about 4,000 tons in 1952, with the 1957 goal set at around 8,500 tons. Tungsten (wolframite) output was about 20,000 tons in 1952, and will be about 30,000 tons this year. Mechanization of the mines in Kiangsi and Kwantung will help to achieve this goal.

Output of tin concentrates is expected to rise from 5,400 metric tons in 1952 to about 9,720 tons in 1957. Probable approximate tin content of this output was 3,240 metric tons in 1952, and should be about 5,832 metric tons in 1957. To meet the increased goal, two new electrical power stations were scheduled for operation in 1956 at Kochiu, chief tin producing center in Yunnan Province. During 1956, high-grade

tin metal of Chinese origin appeared on the European markets.

The Five Year Plan also calls for expansion of aluminum production at Fushun. In 1944, when this area was under Japanese control, output was about 12,000 tons.

Vigorous prospecting and detailed surveying programs are being carried on. Chromium, bismuth, nickel, beryllium, cadmium, manganese, antimony, and quicksilver ores are among those receiving special attention.

Phosphorus deposits were found in 1956 in the southwest part of the country, with laboratory tests reportedly showing that the ore contained 30 percent phosphorus. Uranium-bearing minerals were said to have been located in Liaoning, Kwangsi, Kiangsi, and Sinkiang.

## Phelps Dodge, ASARCO, and Kennecott Active in Highland Valley, B.C.

Phelps Dodge Corporation, leading Arizona copper producer, has taken a five-year lease and option on more than 1,000 copper claims of Jericho Mines Ltd., N.P.L. in Highland Valley, British Columbia.

Under the terms of the lease, Phelps Dodge must carry out exploration or development work on the claims each year from May to November. If and when Phelps Dodge decides to form an operating company, Anson Mines Limited, ownership would be 75 percent by Phelps Dodge and 25 by Jericho with the majority having the option to acquire the minority stock at a price amounting to 25 percent of the profits during the first 10 years of operation. This is to be determined by the average of the profits for first three years of capacity production.

The accompanying map shows the approximate location of the five claim groups covering more than 50,000 acres. The claims are in the Highland Valley area about 100 miles north-east of Vancouver and 20 miles south of Ashcroft.

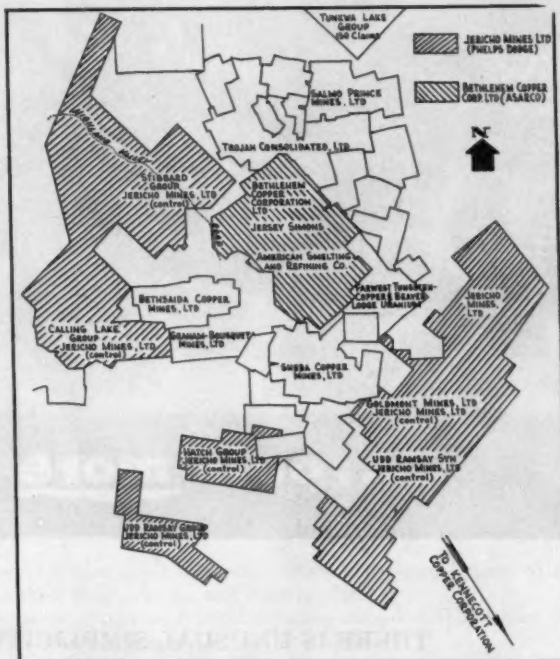
Hamlin B. Hatch, Jericho's consulting geologist who played an important part in the negotiations, reports that the "Highland Valley situation is one of great promise and has all the aspects of developing into a very large tonnage low-grade copper camp. One of the ore's salient features is the total lack of pyrite. This is the dissimilarity between the Highland Valley ores and the porphyry ores of the United States. The ore minerals in Highland Valley are mainly malachite, chalcophyrite, and bornite. They are invariably associated with minor amounts of molybdenite; in places it is an important economic factor."

The entire area is underlain by the Highland Valley granite batholith. The main fault on Jericho ground is the Witch's Brook fault. Three mineralized zones have been located on the surface; two outcrop and the third was located by diamond drilling. In addition, geophysical prospecting has located five large and four small anomalies along a strike length of about three miles. Surface prospecting has indicated copper mineralization in five widely spaced localities in the area covered by anomalies.

R. Franklin Stibbard, Jericho's president, announced that his firm will be repaid all monies spent to date on the claims, about \$200,000, from the initial net proceeds of operation. He further said that if the operating company, Anson Mines, sells any of its treasury stock to raise additional funds Jericho will have the right to subscribe for 25 percent.

Negotiations in behalf of Phelps Dodge were carried out by Charles R. Kuzell, vice president; Walter C. Lawson, western operations general manager; J. B. Pullen, assistant general manager; and E. E. Maillot, chief of geophysical research. Phelps Dodge geologists Hope and Geary have moved from Douglas, Arizona to Highland Valley to supervise exploration. Additional men and equipment will be sent from Douglas.

While this is the largest claim transaction in Highland Valley, two other United States copper producers are also very active. American Smelting and Refining Company has spent about \$800,000 on the claims of Bethlehem Copper Corporation shown on the map. To the southeast of the map area, Kennecott Copper Corporation has spent more than \$200,000 on deep drilling on Bethlehem's Mamit Lake claims. This drilling has been along the fringes of the granite batholith with reportedly negative results. Kennecott is continuing drill-



ing through its subsidiary, Northwest Explorations Limited.

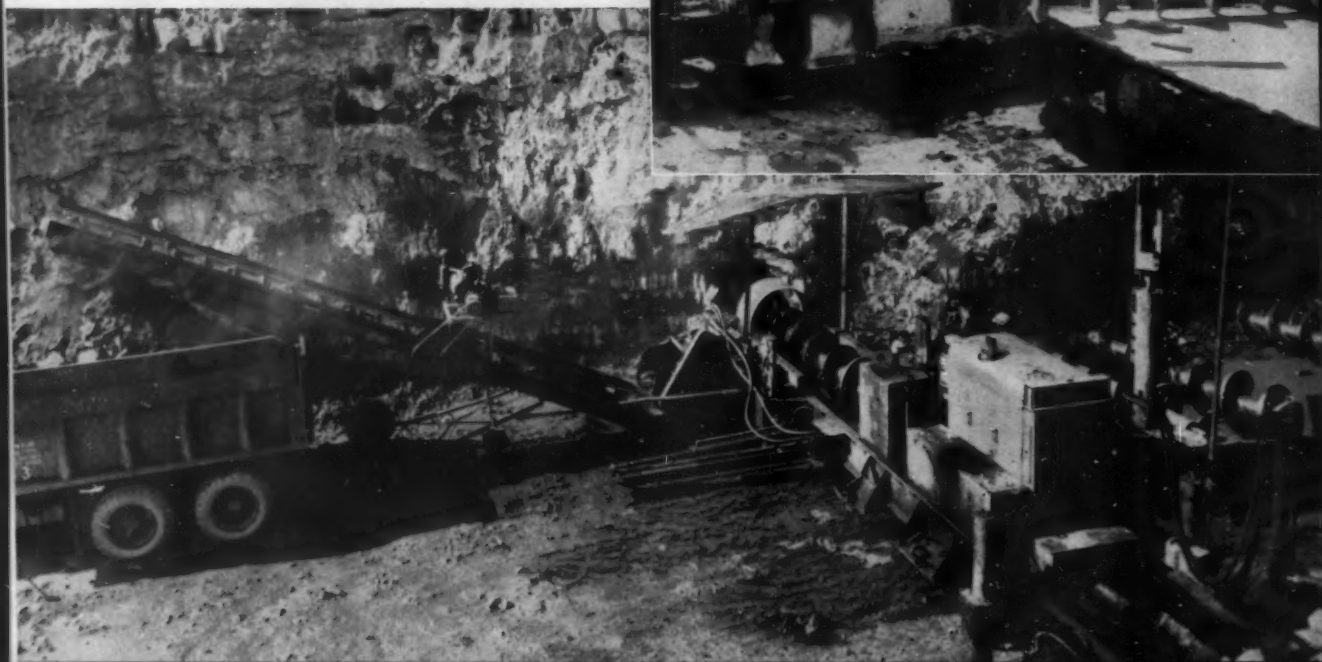
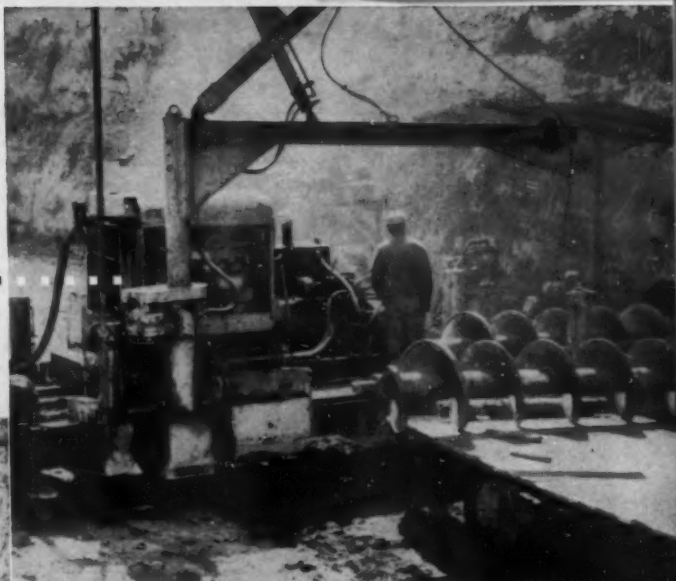
ASARCO's drilling has been concentrated in the Jersey zone where indicated reserves are: 30,330,000 tons assaying 0.796 percent copper, 22,245,000 tons assaying 0.518 percent, and 5,400,000 tons assaying 0.357 percent. Inferred reserves are 15,000,000 tons of 0.5 percent grade. In the Iona zone 25,000,000 tons of 0.7 percent copper are inferred.

This summer ASARCO has concentrated exploration in the Simons zone which is down hill from the Jersey zone and should be mined in sequence because of the efficient disposal of overburden from the Jersey zone which will be mined by open pitting. Both drilling and surface stripping and trenching are underway in this zone.

Meanwhile, ASARCO's engineering staff is investigating power plant sites, camp sites, railroad rights of way, etc. because September 1958 is the date that ASARCO must announce its plans for production from Bethlehem properties.

Reserves already developed indicate a bright future for Highland Valley. It may take several years for Phelps Dodge to fully explore its properties but its holdings are strategically located and one hole put down by Jericho showed mineralization for its full depth of 717 feet.

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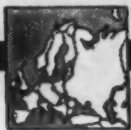
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## EUROPE

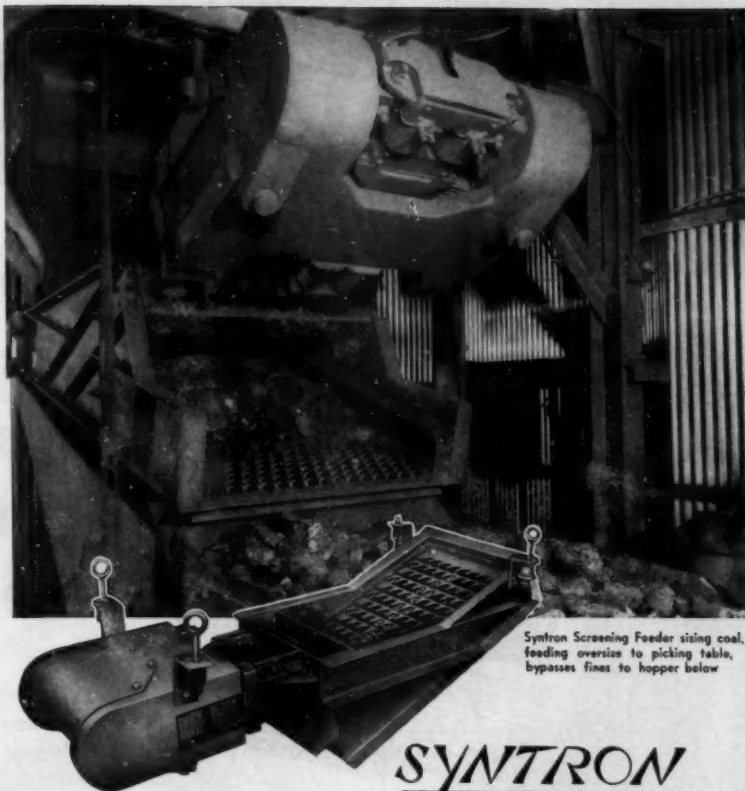
**WEST GERMANY**—German participation in the development of iron ore deposits in French North Africa is now under serious consideration, and plans are also being studied for investment in Brazilian iron ore mines. Both projects are receiving attention because the German steel industry is anxious to secure the raw materials for its expanding steel industry. During 1956, Germany imported 18,000,000 tons of iron ore which is the equivalent of 30 percent of the total world trade in this item.

**ITALY**—During the first three months of 1957, exports of sulphur totaled 44,257 tons, as compared with 32,662 tons during the same period of 1956, and only 624 tons in the first quarter of 1955.

**EIRE**—Mining operations have ceased at the St. Kevin's lead and zinc mine at Glendalough, County Wicklow. It is not known yet whether the shutdown will be temporary or permanent.

**YUGOSLAVIA**—According to recent reports, Yugoslavia is planning to build up its aluminum production to become the world's second largest exporter, after Canada. The 1956 production was 14,500 tons. The country's bauxite production could be expanded to 1,500,000 tons yearly, making it the second largest European producer after France. Bauxite reserves in Yugoslavia have been estimated at 100,000,000 tons, but containing quantities of titanium, vanadium, and uranium. Recently, Yugoslavia signed an agreement with the Soviet Union and East Germany whereby it received an initial loan of \$175,000,000 to develop bauxite deposits and to construct aluminum plants. (See MINING WORLD, February 1957, page 103).

**U.S.S.R.**—Aluminum production is estimated to have increased about 8 percent during 1956 in the Soviet Union, with 455,000 metric tons of virgin metal and 75,000 tons of secondary metal produced. Because of plant expansion and improved technical methods, capacity has increased by about 12 percent to an estimated 540,000 tons, over the 1955 figure of 480,000 tons capacity. A possible 1,000,000-ton output is forecast for 1961. Capacities have been estimated for the major aluminum plants during 1956 (compared with 1955): Krasnoturinsk, 110,000 tons (110,000); Kamensk, 100,000 (100,000); Stalinsk, 100,000 (85,000); Zaporozhe, 100,000 (75,000); Sumgait, 60,000 (50,000); Volkhov, 45,000 (40,000); Kandalaksha, 20,000 (15,000); Yerevan, 5,000 (5,000). At the Turgai bauxite deposits in Kazakhstan, work is being accelerated. Development work is also being spurred on at the nepheline deposits near-by to provide sufficient ore for the alumina plant under construction at Achinsk. The alumina will be sent to a reduction plant being built at Krasnovarsk. A large aluminum plant is said to be under construction at Stalinograd which will have an annual capacity of 30,000 tons. A small 10,000-ton plant is reported to be operating at Nadvoitsy, about 500 kilometers northeast of Leninograd; and under the present Five Year Plan it is supposed to be expanded to 26,000 tons capacity. Aluminum plant



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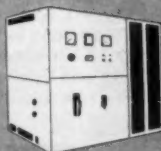
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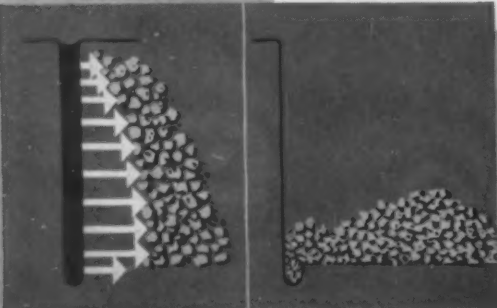
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capacities for Soviet bloc countries during 1956 were: Hungary, 52,500 metric tons; Poland, 30,000; China, 20,000; East Germany, 20,000; Czechoslovakia, 10,000.



## ASIA

**ISRAEL**—Production is expected to begin late this year or early in 1958 at the King Solomon copper mines at Timna, near the Israeli Red Sea port of Eilat. Work on the refining installations is now in its last stage. The copper ore will be mined by the open-pit method and will be turned into cement copper of 80 percent copper content which will be sent abroad for electrolytic refining. Total output is expected to amount to 7,000 tons of copper annually of which 1,200 to 1,500 tons only will be needed for home consumption. Proven reserves of ore are estimated at 7,000,000 tons with probable reserves of 25,000,000 tons. The Timna project is being carried out by the *Israel Mining Corporation*, a government concern, at a cost of about \$8,000,000.

**MALAYA**—The six-month-long strike at the *Raub Australian Gold Mining Company Ltd.* has now been settled, but it is expected to take 12 months before the mine is back in full production. The major problem is the pumping out of water which is 107 feet deep in the main section.

**TURKEY**—The *MTA Institute* has now formed a special commission which will plan for the large aeromagnetic survey to be undertaken in 1958. The new commission will decide which district shall be examined. The search will be principally for iron ore and uranium. Several international aerial exploration companies are bidding for the job.

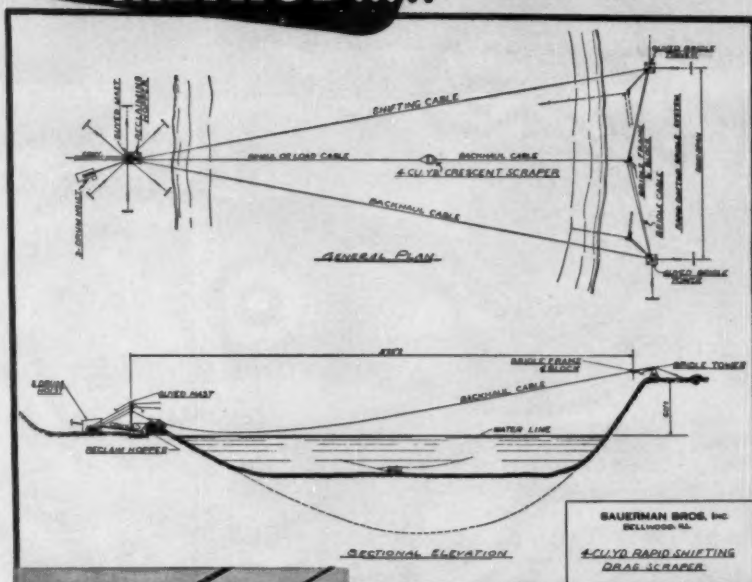
**JAPAN**—*Mitsui Mining & Smelting Company Ltd.*, which started to carry out an expansion program at its Hibi smelter in Okayama-Ken and the Takehara smelter in Hiroshima-Ken last year, expects to complete the work in September. The production capacity of both smelters is being increased from the current rate of 1,000 metric tons of electrolytic copper per month to 1,500 metric tons. The raw materials are now coming from *Sipalay* copper mine in the Philippines under a common smelting contract with *Elizalde & Company*.

**MALAYA**—*Tambun Mining Company*, formed recently, with a part of the ownership held by *Eastern Metals Ltd.*, has made its first shipments of ore to Formosa. The *Tambun* mine is in the vicinity of Ipoh, and has already produced more than 50,000 tons of high-grade ore containing 60 to 70 percent iron. The estimated iron ore potential is more than 1,000,000 tons on an 80-acre site leased on a tribute basis from a private owner. It is estimated that it will take the company five to six years to work out the area. A private railroad track has been built to take ore from the mine to the railway line. Later shipments of the company's ore are scheduled for Japan.

**CYPRUS**—Stripping and other operations for opening up the new *Kinoussa* ore body of the *Esperanza Copper & Sulphur Company* are ahead of schedule. With initial production already attained, the output of copper ore to meet present

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contract commitments over the next three years is virtually assured. Erection of plant modifications of the Limni mill is still suspended because the capital resources of the company are considered inadequate for this undertaking at present. Work, therefore, is concentrated on profitable mining of Kinousa ore.

**TURKEY**—*Hasancelebi* iron ore deposit (near the town of Hekimhan in east central Turkey) is being worked by *Bilgin Mining Company*. It is reported that first results indicate that the ore consists from surface downward, of hematite, magnetite, and siderite. It also appears that deep lying siderite deposits may be quite large.

**PAKISTAN**—The Chitral Valley in the extreme northwest is to be developed for its mineral resources. As a first step, transportation facilities will be constructed to link the valley with the rest of the country. Chitral is rich in iron ore, as well as other minerals. The iron ore is particularly needed now because of the proposed Multan iron and steel plant which is under construction, although deposits at Kalabagh are believed sufficient to supply the new plant. A search is underway for limestone for fluting, and prospecting was recently carried out in Dera Ghazi Khan in hope of finding a deposit near the plant site.

**JAPAN**—A high-grade uranium deposit has been reported in the southeastern part of Iwate Prefecture. Located in a mountainous region, the deposit is said to be at an elevation of 1,640 feet above sea level. It has been named the *Onigasa* deposit, and is owned by the *Nitetsu Kogyo Kaisha*.

**INDIA**—The *Central Geological Department* has recommended a survey of the Garhwal and Almora district of Uttar Pradesh for reserves of magnesite deposits because of the increasing demand under the expansion of the iron and steel industry in the country. A new ministry called "Iron & Steel, Mines and Fuels" has been set up as follows: Department of Iron and Steel—jurisdiction over steel plants at Rourkela, Bhilai, Durgapur, Mysore, and all steel plants in the private sector; Department of Mines—supervision of all mines and mining, the Indian School of Mines & Applied Geology at Dhanbad, special mining projects, Indian Bureau of Mines; Department of Fuel—all fuel, including coal, lignite, oil, and gas. Sardar Swaran Singh is in charge of this ministry, assisted by K. D. Malviya. The Geological Survey of India and the Central Board of Geophysics are under the Ministry of Education and Scientific Research headed by Maulana Abul Kalam Azad.

**JAPAN**—The *Japan Titanium Manufacturers Association* announces that the Japanese titanium industry has increased its production goal for the current fiscal year to 4,382 tons because of increased exports. Output in the previous year had totaled 3,991 tons of titanium sponge, with exports totaling 3,011. The three titanium sponge manufacturers are expected to produce about 520 tons monthly, after December 1957, compared with the present output of 300 tons. All are undertaking expansion programs in their plants. *Osaka Titanium Company* will increase capacity from 120 tons to 200 tons monthly later this year. *Toho Titanium Company* will increase from the present 160 tons monthly to 250 tons after December; *Nippon Soda Company* will raise capacity from 20 tons to 70 tons, after October.

**INDIA**—The *Indian Atomic Energy Department* reports it has located somewhere in northeast India (identity undisclosed) a 3,300,000-ton ore deposit containing 300,000 tons of thorium and 10,000 tons of uranium. The deposit is also said to contain about 80,000,000 tons of ilmenite, and is expected to overshadow the well known beach sand deposits of Travancore.



**QUEBEC**—A new company, *Hudson Ungava Nickel Mines Ltd.*, whose management will be provided by *The Rio Tinto Mining Company of Canada Ltd.*, has been formed. Hudson Ungava has a wholly owned subsidiary, *Sugluk Quebec Mines Ltd.*, which has been granted a mineral exploration license covering two adjoining areas comprising 96 square miles located in the Cape Smith-Wakeham Bay area of Ungava in the northern part of Quebec. Hudson Ungava is participating in the joint airborne electro-magnetic survey which is being undertaken in the district and in addition will carry out a ground exploration program this summer at an estimated cost of \$75,000.

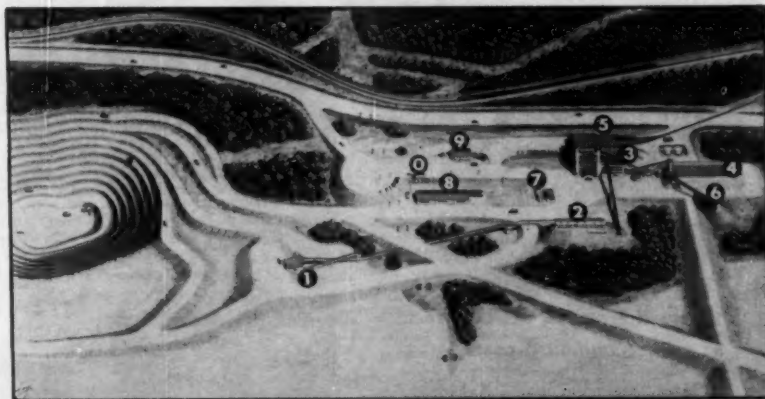
**ALASKA**—*Boyles Brothers Drilling Company* has a contract to drill the uranium property of *Southeastern Mining and Exploration Company*. The latter has a DMEA contract to assist in this work. Equipment and supplies were lifted to the property at 1,800 feet elevation by helicopter. The operation is near William Henry Bay on the Lynn Canal.

**LABRADOR**—Four West German steel firms are reported to have joined with a United States firm in the development of Canadian iron ore deposits in Labrador. The joint undertaking includes the *Freidrich Krupp* firm in Essen, *Hoesch Bergwerk* of Dortmund, *Mannesmann Roehrenwerke* of Dusseldorf, and *Huetterwerk Oberhauser* of Oberhausen. The American partner is Canadian-born financier Cyrus S. Eaton. German technicians are already making preliminary plans to extract ore in the Ungava field.

**ONTARIO**—*Arcadia Nickel Corporation Ltd.* reports that good progress is being made in sinking the main production shaft to its 1,250-foot objective. The 350-foot level station has been established, and stope preparation is continuing on the 500 level with the ore pass system being cut on the 350, 500, 650, and 800 levels. The 950 East Drift has been carried 1,509 feet east from the No. 1 shaft. The site for the 1,200-ton mill has been cleared and excavation started. The former Mindamar mill is being dismantled and moved to the mine site.

**BRITISH COLUMBIA**—*Consolidated Mining and Smelting Company of Canada, Ltd.* has suspended production of zinc, lead, and copper ores at its *Tulsegah Chief* mine in northwestern British Columbia because of a "disturbed market situation." About 200 employees had been producing 550 tons of ore daily. Production was started in 1951.

**ONTARIO**—*Pater Uranium Mines Ltd.*, under the direction of *The Rio Tinto Mining Company of Canada Ltd.*, reports the latest results of its underground development program near Spragge. Following completion of lateral work on the

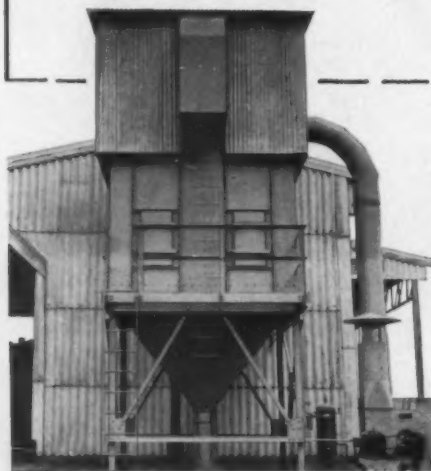


## Black Lake Will Raise Canadian Asbestos Output

An architect's conception of the new asbestos fiber mill, now under construction at Black Lake, Quebec, by *Lake Asbestos of Quebec, Ltd.*, a subsidiary of *American Smelting and Refining Company*, is shown above. Before work is completed *ASARCO* will have spent over \$32,000,000 in the development of this property. Initial benching work is now underway to reach the asbestos ore deposits which are being uncovered by the dredging and draining of Black Lake. When in full operation, the *Lake Asbestos* operation will produce over 100,000 tons of high-grade chrysotile asbestos fiber annually. Proved reserves can support this production rate for more than 40 years. Steel work on the \$9,000,000 mill and auxiliary structures has already started. Ore from the open pit will be transported by truck from the drained lake to the primary crusher (1), and then carried by conveyors to the wet rock storage pile (2) and the dryers (3). From there, it will be conveyed to dry rock storage (4) and by underground conveyor to the 14-story mill (5). Tailing is conveyed to the tailing pile by overhead conveyor (6). An electric substation (7), shop and garages (8), company offices (9), and the change house (10), will be located as indicated on the drawing above. Canada's King's Highway, which was re-located by *ASARCO* to make room for the mining and milling development, now runs directly in back of the property.

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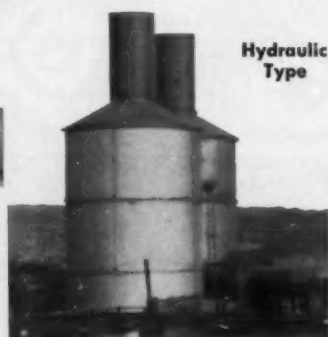


Automatic Bag Type

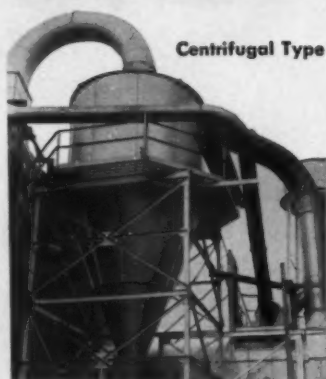
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## INTERNATIONAL

950 level, three crosscuts were driven into the hanging wall and nine inclined holes were drilled to test the downward continuation of the ore between 200 and 300 feet below the level. These gave an average grade of 2.62 percent copper over an average true width of 9.7 feet. A bulk sample will be shipped out for treatment tests.

**YUKON TERRITORY**—The Yukon Consolidated Gold Corporation Ltd. has seven dredges in operation this season. These are the No. 4, 6, 8, 9, 10, 11, and 12, together with the hydraulic plant on Paradise Hill. Preparatory work has begun for a second hydraulic operation on Dominion Benches. All plans this season are contingent on labor being available.

**YUKON TERRITORY**—Galkeno Mines Ltd. (formerly Mackeno Mines Ltd.) is carrying out an extensive depth development program following encouraging progress made in developing ore on the present bottom (5th) level. The silver-lead-zinc properties are in the Mayo district of the Yukon.

**BRITISH COLUMBIA**—Consolidated Mining and Smelting Company of Canada, Ltd. is said to be considering production of pig iron and steel from pyrrhotite tailings at the Sullivan mill at Kimberly. An estimated 900 tons of iron and 600 tons of sulphur are contained in the tailings daily and many millions of tons have accumulated in the last 30 years. Research has shown various commercial products can be produced with electric furnace methods and a plant is being designed to obtain detailed estimates of capital and costs involved.

**ONTARIO**—Noranda Mines Ltd. and Anglo-Huronian Ltd. have purchased from Mogul Mining Corporation its control of Coldstream Copper Mines. Mogul has held a management contract with Coldstream extending to May 31, 1963. This has now been revised and turned over to Shield Development Company, a Noranda-Anglo operation which holds the ground adjoining the Coldstream. The new 1,000-ton mill was started up last month.

**MANITOBA**—McWatters Gold Mines, together with Northlodge Copper Mines and Calmor Mines Ltd., has acquired by staking a 120-claim nickel-copper prospect in the Thompson-Moak Lake area. The Partridge-Crop fault on which nickel occurrences have been reported runs through the center of the property. An electromagnetic survey is underway. McWatters holds a 50 percent interest, Northlodge has 40 percent, and Calmor the remaining 10.

**NORTHWEST TERRITORIES**—North Rankin Nickel Mines has gone into limited production after several weeks of delay because of mechanical breakdowns and difficulty in obtaining spare parts. The mill's full capacity of 250 tons daily is expected to be reached soon. A number of promising sites around the mine are scheduled for full-scale exploration and diamond drilling this season. Ore reserves at the mine are estimated at 460,000 tons, including 273,000 tons averaging 4.55 percent nickel and 1.05 percent copper, and 187,000 tons averaging 1.46 percent nickel and 0.45 percent copper.

**BRITISH COLUMBIA**—Diamond drilling depth exploration of extensive anomalies is under way by Western Copper-ada Mining Corporation of Montreal at the Copperada property of Guichon Mines Ltd. in Nicola Valley. This work follows

months of geophysical survey. William L. Young of Ottawa is consulting geologist.



**MEXICO**—Russell Bryan and Associates Inc. of San Francisco, California has just completed the engineering planning of an iron mining operation in Mexico for Las Encinas S.A., and has been engaged to manage the mine development and construction of facilities. The planned capacity of the mine and crushing plant is 2,500 tons of high-grade iron ore per day.

**CUBA**—A new lead mine called *La Argentifera* has been placed in operation in Pinar del Rio Province. Adjoining it is a smelting plant. Both plant and mine are operated by the *Minera Nuevo Horizonte Company, S.A.* Arthur Hall of Denver, Colorado is in charge of the plant, which is expected to produce 15 tons daily.

**DOMINICAN REPUBLIC** — *Falconbridge Nickel Mines Ltd.* of Canada has formed a Dominican subsidiary which, in association with another firm, holds a concession covering over 300 square miles in which there are several lateritic nickel deposits of possible interest. A program of test pitting has outlined a substantial tonnage. Preliminary metallurgical testing is proceeding, although this work has not yet advanced to the stage of a pilot plant program.

**PERU**—*Consolidated Guayana Mines* is conducting a limited amount of diamond drilling at its optioned *Tintaya* copper prospect in southeastern Peru to test the sulphide ores at depth. Surface exploration has indicated at least 610,000 tons of oxide copper ore averaging 3.52 percent Cu. The company also has several other interests in and options on copper prospects, including the *Jarhuarazo* option in south central Peru where there are indications of high-grade silver-copper ore. Negotiations have been underway for some time to put the *Chavin Mines Corporation* property into production. (Chavin is owned by *Frobisher and Consolidated Guayana*). Ore reserves are estimated at 301,000 short tons averaging 8.3 percent lead, 11.4 percent zinc, 1.0 percent copper, and 4.0 ounces silver per ton.

**MEXICO**—The promising alunite deposit found at Juventino Rosas, Comonfort, and San Miguel Allende in the state of Guanajuato, have been set aside as national reserves and will be explored by the National Institute for the Investigation of Mining Resources. In announcing this action, the Economy Ministry said no further concessions for mining other substances of any kind will be granted in these zones although the rights of existing companies, as well as those who filed claims before April 9 of this year, will be unaffected.

**BRAZIL**—The Brazilian House of Parliament is said to be considering a law which would prohibit exporting of manganese ore from the state of Minas Gerais. According to the law, the ore produced in this area would be used by the steel plants of Volta Redonda, Cosipa, and Usiminas. Reason for this action would be the fact that the man-

## Active United States Purchase Contracts with Foreign Tungsten Producers as of December 31, 1956

Issued Contract Date	Mining Company	Country	Undelivered Balance (Short Ton Units) 12/31/56	Unit Price in effect 12/31/56 Per Short Ton Units	Termination Date
2/ 6/51	King Island Scheelite	Australia	101,250	\$55.00	4/ 8/58
6/22/51	Wah Chang Corporation	Brazil	414,460	55.00	12/ 4/59
5/ 1/51	Minerales y Metales	Argentina	179,140	50.00	6/30/58
10/11/51	S. A. Fermin Malaga	Peru	118,250	46.739	12/21/58
10/ 2/51	Canadian Exploration, Ltd.	Canada	180,000	55.00	12/21/58
12/31/51	Bolivian Tin & Tungsten	Bolivia	58,333	58.00 <sup>1</sup> 55.00 <sup>2</sup>	12/31/57
3/18/52	Beralit Tin & Wolfram	Portugal	39,000	47.50	9/30/57

<sup>1</sup> Grade A.

<sup>2</sup> Grade B.

ganese reserves in this state are rapidly being depleted. In 1893 the reserves were calculated at 16,000,000 tons; they are presently estimated at 5,000,000 tons, and presumably will be completely exhausted by 1967. The country as a whole produces about 600,000 tons of manganese ore annually. In the Territory of Amapa where important deposits are located, the Brazilian firm of *Industria e Comercio de Minerios S.A. (ICOMI)* and the United States firm, *Bethlehem Steel Company*, have constructed a 192-kilometer railway from the mines to the port of Macapa where they plan to load 2,000 tons of manganese ore per hour into ships. The *United States Steel Company* which has interests in manganese deposits in Mato Grosso state has already studied the possibility of producing 100,000 tons annually.

**CUBA**—Iron ore mined in two new mines in Las Villas province is reported to have an iron content of 56.78 percent. The mines are the *Habanera* and the *Renacimiento*, near Cienfuegos, operated by the *Compania Minera Mallo S.A.* The mines are said to have made their first shipment—5,000 tons—toward the end of May. The firm is also planning to mine and concentrate copper near Cienfuegos, and operates another iron mine near Gao in Las Villas.

**MEXICO**—Samples of gold and silver from a location on the Villalpando Peak in Guanajuato are being subjected to extensive laboratory tests to determine whether they are rich enough for commercial development. This region once furnished nearly 60 percent of the silver in circulation in Mexico but in recent years it has fallen into decadence because of a shortage of workable veins, machinery, and investment capital.

**HAITI**—*Reynolds Haitian Mines*, a subsidiary of *Reynolds Metals Corporation*, is now making shipments from its bauxite property near Miragoane to Corpus Christi, Texas. The \$8,000,000 investment has taken more than two years of development before production was attained. The mines are located 2,000 to 3,000 feet above sea level, overlooking the pier built by Reynolds at Miragoane. The bauxite is trucked for 6 to 12 miles down to the shore where it is stockpiled awaiting shipment.

**CHILE**—The main haulage tunnel in the *El Salvador* mine of *Andes Copper Mining Company* is being steadily advanced about 30 feet per day on a three-shift basis. Drilling is accomplished by jacklegs from a jumbo. Mucking is done by an Eimco 105 shovel loader which conveys the muck from the face into a vehicle called a "cuchifleta" which is actually three cars hooked in tandem with a 50-horsepower Joy slusher mounted on the portal end. One trip with the cuchifleta normally hauls all of the muck. Four to six blasts are made daily, with only 10 to 15 minutes required to clear the tunnel of smoke so that mucking operations can start. Reserves in this mine have been estimated at 300,000,000 tons averaging 1.6 percent copper.

**BRITISH GUIANA**—Large-scale manganese production will be underway in 1959 at properties of *Northwest Guiana Mining Company, Ltd.*, subsidiary of *Union Carbide & Carbon Corporation*. Production will start at 10,000 tons a month and should reach 30,000 tons a month by 1961. The company will invest \$12,000,000 in the project and will construct a 38-mile railroad to convey the

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ore to point of shipment from the company's properties in the northwest district near the Venezuelan border.

**ARGENTINA**—Two Westinghouse 26,500-kilowatt electric generators have been sent to the site of Argentina's \$250,000,000 steel mill project at San Nicolas, 150 miles north of Buenos Aires. This was the first major shipment from the United States under the Export-Import Bank's \$60,000,000 loan to Argentina. The integrated mill will have a capacity of 558,000 ingot tons annually and will be operated by *Sociedad Mixta Siderurgia Argentina, S.A. (Somisa)*. Somisa will purchase a total of \$100,000,000 worth of United States equipment for the mill, 60 percent to be financed by the Export-Import Bank loan.

**BRAZIL**—A study of the economic potential of low-grade iron ore reserves in Brazil will be conducted by *Armour Research Foundation* of Illinois Institute of Technology, Chicago. The Foundation has been contracted by the Brazilian government to make the study in the state of Minas Gerais where the highest concentration of Brazilian iron ore is located. The Foundation will study the economic feasibility of processing and shipping this ore from Minas Gerais to the coast 300 miles away to compete in the world market.

**MEXICO**—A survey is being made in Zacatecas by the government agency, *Nacional Financiera, S.A.*, to determine the feasibility of reviving work in more than 35 abandoned mines in that area. The investigation was prompted by several mining men who claimed that these mines were never fully developed.

**VENEZUELA**—The *National Gold Company (ORONAC)* has opened a refinery to process gold produced by the Callao mines in the southern state of Bolivar. ORONAC signed a contract two years ago to purchase the complete output, nearly 10,000 pounds troy annually, from the Ministry of Mines, which operates the Callao mines. The new plant will be able to produce 24-karat gold. Previously, ORONAC sent its gold to the United States for refining and storage before returning it to Venezuela.

**BRAZIL**—The new steel plant of the *Companhia de Ferro e Aço de Vitoria* will produce 100,000 tons of steel and 84,000 tons of laminates annually. The plant will commence production in March 1958.

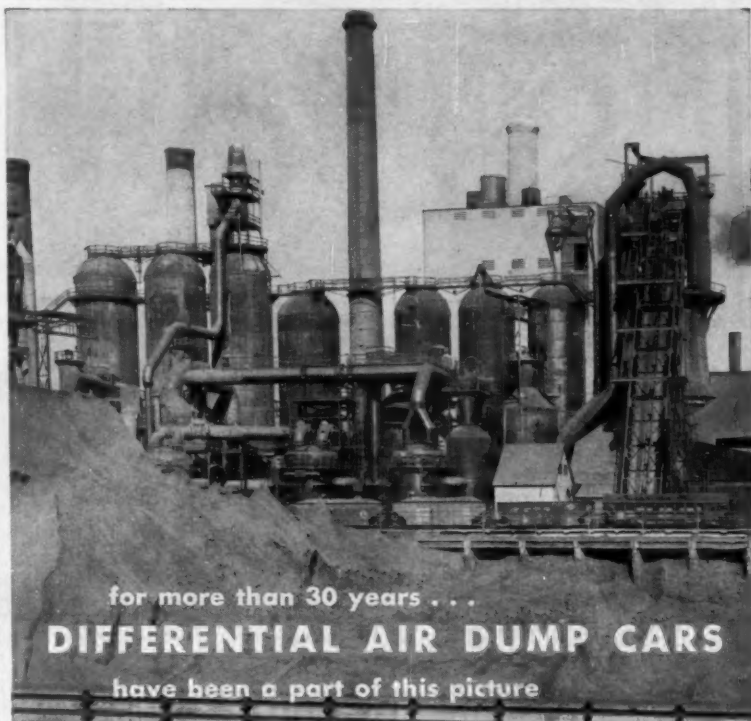


**QUEENSLAND**—*Rio Tinto (Australia) Exploration Pty. Ltd.* has been granted authorities to prospect over 871 square miles on the Cloncurry mineral field. The permits cover all minerals except uranium. A joint search for base metals is being made in Northern Territory and northwestern Queensland by *Mount Isa Mines Ltd.* and *Consolidated Zinc Corporation Ltd.* In addition to the three companies mentioned above, *Mining Corporation N.L.*, *United Uranium N.L.*, and others are engaged in similar work. The area contains pre-Cambrian rocks, and the prospects of discovering major new copper ore bodies are considered good.

**REPUBLIC OF THE PHILIPPINES**—*Marinduque Iron Mines Inc.* is moving ahead with plans for erection of a multi-million peso copper refinery, smelter, and fertilizer plant at Iligan, Lanao. Purchase of the necessary machinery and equipment reportedly was arranged recently in the United States. The smelting plant will process copper ore from the *Eltizalde* enterprises in Visayas and Mindanao for shipment abroad. Also available for feeding the plant will be concentrates to be produced by Marinduque from its 3,000-ton mill at Sipalay, Negros Occidental, and from its Bagacay property. It also plans to bring into production other mines in the Davao area and in Zamboanga.

**INDONESIA**—Japanese geologists, accompanied by a military unit, have investigated the area around Bihara, district of South Balangan, regency North Huli Sungai, Borneo, for iron ore. If ore reserves are sufficient for profitable development, an open-pit mine will be undertaken.

**NEW ZEALAND**—*Kaiser Engineers* of California has reported to *Fletcher Holdings Ltd.* (a public company) that the possibility of an economic iron and steel industry seems to be assured. They advise that a final decision must wait for largescale tests and detailed investigations of the country's iron sands. Kaiser has acted as consultant not potential investor in this project. The firm proposes



Photo—Courtesy Weirton Steel Co.

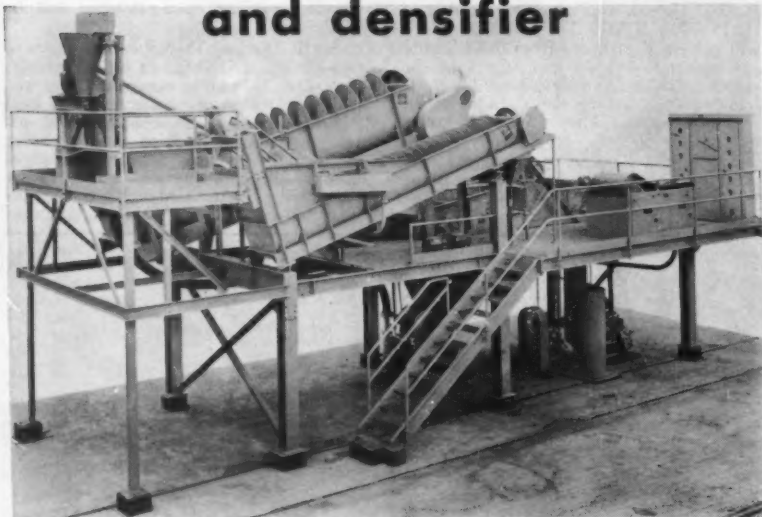
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## **INTERNATIONAL**

the use of titano-magnetite sands of the North Island's west coast beaches.

**NEW SOUTH WALES**—Associated Minerals Consolidated N.L., a rutile and zircon producer operating at Cudgen and elsewhere, will soon start drilling under water in shallow streams to test for heavy minerals. The first site will be near south Stradbroke Island. A number of prospecting areas have been taken out by various companies on the seaward side of their beach leases. The drill to be used by Associated Minerals has been designed by the company and will operate from a barge in shallow water.

**INDONESIA**—Newly discovered manganese ore deposits are reported from the regency of Tjiamis (West Java), in the Pangandaran district, near Kedungwuluh, Tjibogo, Tjitjapar, Padaheran, Tjigandung, and Kaliputjang. It is supposed that the manganese is of the same quality as that of the Karangnunggal deposits developed by the N.V. A.I.M.E. which contained 80 to 90 percent MnO<sub>2</sub>; a smaller part consisted of metallurgical ore of about 45 percent Mn.

**REPUBLIC OF THE PHILIPPINES**—Baramor Chromite Mining Corporation will undertake expansion of operations at its property. The action is prompted by the recent discovery of chromite on the firm's property.

**NORTHERN TERRITORY**—Broken Hill Pty. Company Ltd., steel producer of Newcastle and Port Kembla, with iron ore quarries near Whyalla, South Australia, and at Yampi Sound, West Australia, has discovered large deposits of low-grade iron ore at Roper Bar in the Northern Territory. Roper Bar presumably is near the mouth of the Roper River in the southwestern corner of the Gulf of Carpentaria. McArthur River, where Mt. Isa Mines recently discovered 10 percent oxidized lead ore, is about half way between here and the Northern Territory-Queensland border.

**NEW GUINEA**—The Australian Commonwealth government has decided to sell to Consolidated Zinc Pty. Ltd. its half-interest in New Guinea Resources Prospecting Company Ltd. The latter was formed seven years ago by the Commonwealth government and the British Aluminium Company Ltd. for the purpose of conducting surveys in Papua, New Guinea, and elsewhere for hydroelectric power and bauxite. A condition of the agreement is that supplies of bauxite and alumina must be made available at a satisfactory price to the Australian Aluminium Commission's plant at Bell Bay, Tasmania which is now at full capacity and is drawing its bauxite from Malaya and Indonesia.

**REPUBLIC OF THE PHILIPPINES**—Nielson and Company reports that many new groups of claims have been located by it in the Bagasan and Mt. Cadig mining districts in Camarines Norte. Although over 50,000 Pesos have been spent in prospecting for gold in the company's mine at Bagasan, main efforts have been concentrated on the development of copper reserves. Three new prospecting adits have been driven and a number of old adits and pits opened, sampled, and assayed. The development work has proved a mineralized area of copper. Several of the Bagasan claims also contain a high grade of magnetite iron, according to L. R. Nielson, chairman of the board. A contract is to be signed for development of these claims. About 1,000,000 tons of limonite ore

averaging 58 percent iron is available for shipping from one of the Mt. Cadig claims, reports Mr. Nielson. A crew is now exploring adjacent deposits by trenching, digging pits, and driving adits to increase this reserve.

**WESTERN AUSTRALIA**—*Westralian Oil N.L.* has been drilling and shaft sinking an old beach area at Yoganup and has proved a minimum of 1,300,000 tons of concentrate carrying 77 percent ilmenite, 14 percent zircon, and 9 percent other minerals. The ilmenite is said to be of particularly high quality, containing 60 percent  $TiO_2$ , as compared with 54 percent  $TiO_2$  in the Capel area. Several producers in the Capel area have recently negotiated contracts with Japan. Both *Western Titanium N.L.* and *Cable (1956) Ltd.* are selling to Japan.

**REPUBLIC OF THE PHILIPPINES**—*Philex Mining Corporation* reports that a mineral area it had explored in 1955 has been released from the central Cordillera forest reservation by the Senate. *Philex* started work on 12 claims in the area in 1955. Later it concentrated work on four of the claims where it was found that the remaining eight were in the reservation. The extent of the ore in the released area is unknown but surface indications point to a substantial additional tonnage besides the 18,000,000 tons of copper which the firm has located on its original claims. At present *Philex* is installing the first of two units of what will be eventually a 3,000-ton-per-day mill.

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**SOUTH AUSTRALIA**—The *Broken Hill Pty. Company Ltd.* will start quarrying operation at the *Iron Baron* iron deposit, 18 miles south of Iron Knob. The *Iron Baron* is a large, high-grade deposit whose extent is not fully known. It lacks the manganese content of *Iron Monarch* deposit, with which it will be blended for smelting. The company will undertake research on deposits of taconite in the vicinity of the richer Whyalla ore bodies.

**QUEENSLAND**—*Tableland Tin N.L.*, operating on Smith's Creek near Mount Garnet, recently reported a record yield of 110.5 tons of concentrates from 283,190 cubic yards dredged. It is expected that difficulties encountered for some time because of hard ground have been overcome and that high yields will continue. Meanwhile, Australia continues to be an importer of tin and requirements will increase when the tinplate mill of *Australian Iron and Steel Ltd.* at Port Kembla (subsidiary of *The Broken Hill Proprietary Company Ltd.*) goes into operation within a year.

**NEW ZEALAND**—The *Snowy River* gold dredge has ended an 18-year-old career, leaving only two active dredges on the West Coast of South Island. Over the years, 160 dredges of varying sizes have worked in this area. The *Snowy River* dredge was one of the most successful, although only a small unit of the sluice-box type. It worked behind Ikamatura in the Grey Valley, and was operated by *Snowy River Gold Dredging Ltd.* of New South Wales, Australia. The only two remaining West Coast dredges, the *Arahura* and the *Kanieri*, are also operated by an Australian firm—*Gold Mines of New Zealand, Ltd.* There is one other gold dredge in the South Island, the *Clutha* working at Alexandra in Central Otago.

**VICTORIA**—Lower levels of *Morning Star Mines N.L.* at Woods Point are reported to be opening up well with values from 10 to 24 dwts. per ton. Though not a large gold producer (about 500 ounces per week), the state's mining industry will receive some stimulation from the fact that history has repeated itself, and a courageous attempt to keep a difficult mine in production appears to be paying off. Meanwhile, the *Amphitheatre* dredge of *Central Victoria Gold Dredging Company N.L.* has sunk and operations will be suspended indefinitely. The state's gold dredging industry has steadily declined in the post-war years as costs have mounted.

**REPUBLIC OF THE PHILIPPINES**—More than two-thirds of the 9,400 foot Palidan drain tunnel of *Itoyan-Suyoc Mines* has been reopened. The first stage of unwatering the Suyoc main shaft to the 1,800-foot level has been completed; the second phase of unwatering to the 2,000-foot level is underway; and the final stage will unwater to the bottom of the shaft, below the Palidan drain tunnel.



AFRICA

**UNION OF SOUTH AFRICA**—*Minerals Engineering Company South Africa (Pty.) Ltd.* is building a vanadium mill in the Transvaal which is scheduled for completion in September. This is a new

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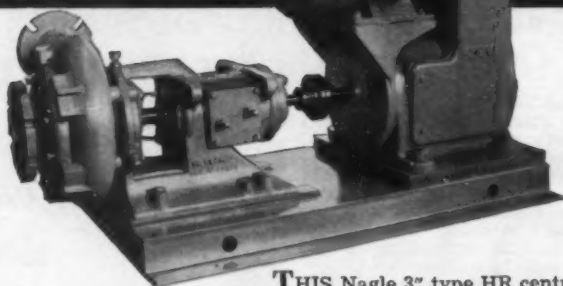
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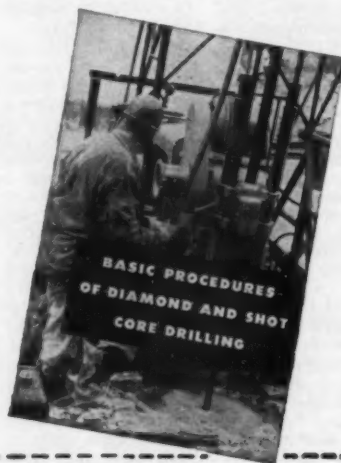
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### INTERNATIONAL

firm organized by *Minerals Engineering Company* of Grand Junction, Colorado, the *Rockefeller Center Inc.* of New York, and *High Speed Steel Alloys Ltd.* of England. Minerals Engineering Company directs the operation, while the other two firms have supplied the financing. The plant will produce 3,600,000 pounds of  $V_2O_5$  annually. Ore will be mined by open pitting in one of the titaniferous iron lenses of the Bushveld Complex.

**SWAZILAND**—*Western Main Reefs Ltd.* has acquired an option over certain concessions in Swaziland, including an alluvial gold deposit. It is understood that the company has entered into agreements with some of the major mining companies for the investigation of these concessions.

**BELGIAN CONGO**—*Union Minière du Haut Katanga*, in agreement with *Comite Special du Katanga*, is preparing to explore for uranium in other parts of the province of Katanga.

**KENYA**—*Frobisher Ltd.* of Canada has obtained exclusive prospecting rights to a 7,900-square-mile concession which is adjacent to the boundaries of Ethiopia and Somaliland and in the northeastern corner of Kenya. The prospecting rights are for minerals and oil. In Northern Rhodesia the company recently obtained prospecting rights for minerals only on a 12,000-square-mile concession extending from the city of Livingstone northerly for 200 miles. Initial reconnaissance work is already under way to determine which areas are particularly worthy of detailed investigation.

**UNION OF SOUTH AFRICA**—*De Beers Consolidated Mines Ltd.* is building a £2,000,000 treatment plant which is scheduled for operation in August 1958. The washing plant, crush, and recovery plants are to be built on a site which is central to the two shafts of the *Bulfontein* and *Wesseltown* mines. Ore hoisted from these two mines will be transported to the new plant by means of conveyor belts; this will replace the rope haulage system now in use. At present the *Wesseltown* mine is idle, but the shafts are being reconditioned and production is expected to start there in early August 1958, when the new electric hoist now being installed will be ready for operation. The *Bulfontein* output will also include the adjacent *Dutoitspan* mine and the diamondiferous ore will be conveyed to the common shaft at *Bulfontein* by an underground electric locomotive haulage system.

**MOROCCO**—Several cobalt ore prospecting permits in the *Bou Azzer du Graraa* area of the Atlas Mountains are reported to have lapsed because the holders have not done the required amount of work on them. It is said that the government would welcome applications for these permits from companies ready to develop the deposits. Officials reportedly are also most anxious to have a cobalt ore concentration plant built in Morocco to treat ore before exportation. The existing *Bou Azzer du Graraa* mines, operated by a subsidiary of the *Omnium Nord Africain*, produced 6,438 metric tons containing 10 percent cobalt last year, compared with 7,573 tons in 1955. The mines have a potential of 10,000 tons because of improved installations. Officials are worried about this decline in production on a deposit which is a potentially important asset. There is a conviction that 20,000 tons could be produced and the operation could be made more valuable if the ore is concentrated on the spot.

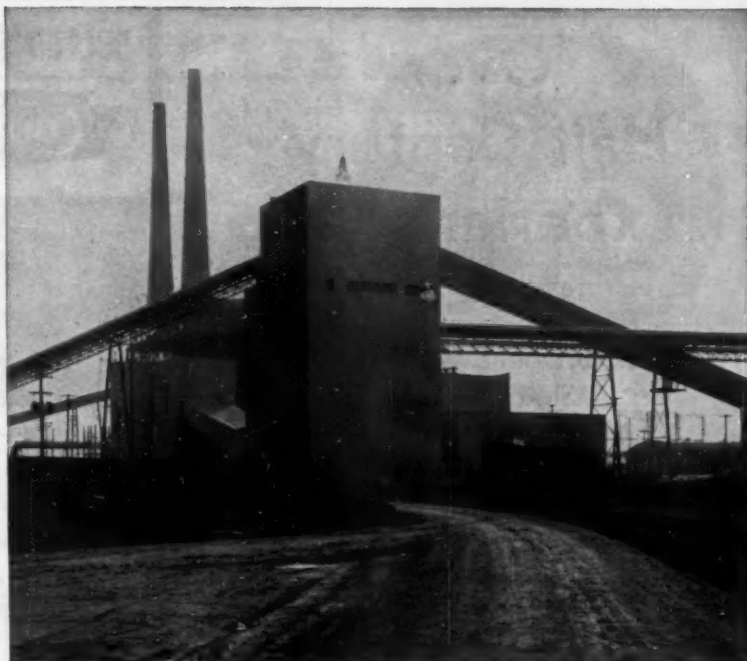
**BELGIAN CONGO**—The 14,530 tons of tin produced by the Belgian Congo and Ruanda-Urundi in 1956 came principally from 13 companies. Contributing to this output were *Geomines* and *Sermikat* in Katanga province; *Belgikaetain*, *Belgikaor*, *Kinoretain*, *Miluba*, *Minerga*, *C. N. Ki*, *M. Grands Lacs*, and *Symetain* in Kivu-Maniema province; and *Georunda*, *Minetain*, and *Somuki* in Ruanda-Urundi Territory. Most of the Congo tin originates in very pure cassiterite concentrates, averaging from 70 to 76 percent tin. A number of mines also produce mixed cassiterite-columbite-tantalite concentrates and mixed cassiterite-wolframite concentrates. Except for *Geomines* which operates a smelter at Manono, practically all tin-bearing concentrates are shipped to Antwerp, Belgium for smelting.

**UNION OF SOUTH AFRICA**—The branch rail line from Potchefstroom to Fochville is to be extended to Vereeniging which will improve ore transportation. This will be of particular help to the Northwestern Cape where there are manganese fields and where the *Sishen* iron ore deposits are located.

**FEDERATION OF RHODESIA & NYASALAND**—*Rhodesian Selection Trust Ltd.* is reported to have conducted an investigation over a claim area near Selukwe where molybdenum ores have been found. Two drill holes apparently have shown excellent results and this has prompted an unidentified South African company to obtain an option for £250,000. Further exploration work will now be undertaken and an additional 10 drill holes have been sited.

**SOUTH WEST AFRICA**—The rail track in the territory serving the main mining areas is to be broadened to the same gauge as in the Union of South Africa at a cost of about £6,300,000.

**UNION OF SOUTH AFRICA**—Among the diamond assets of *De Beers Mines* are potentially diamondiferous deposits along the Namaqualand coast, acquired in 1941. With the end of operations on one holding, *Kleinzee*, in sight, *De Beers Mines* has turned its prospecting attention to the neighboring farm, *Annex Kleinzee*, over which a government mining lease has been granted and of which about 20,000 claims will be initially proclaimed and prospected. Prospecting will also be conducted over the remainder of the farm, and, if economically satisfactory results are obtained, further leases will be granted the company. According to the lease formula, the state will receive 40 percent of the profits plus ruling taxation on the balance. The overall return to *De Beers Mines* is not expected to be substantial. In general, the outlook for gem diamonds is regarded as satisfactory; sales of industrial diamonds have receded due to the cessation of United States stockpiling and a slight decline in open market sales. No important discoveries of diamonds have yet been made by *De Beers Prospecting (South Africa) Ltd.* in the Tuli Block of Bechuanaland or in the Union, or by *De Beers Prospecting (Rhodesian Areas) Ltd.* in Northern Rhodesia. Extension of the block cave method of mining has been continued, and at Jagersfontein, the conversion to this system should be completed by 1960. A new treatment and recovery plant is to be erected by *De Beers Mines*, and this should be initially commissioned by about mid-1958.



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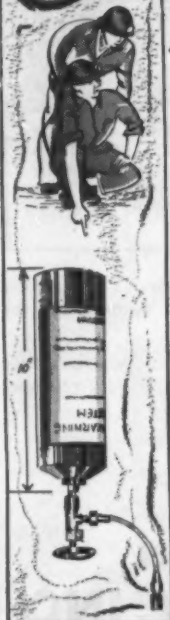
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# U.S.A. Metal & Mineral Prices

## METALS

July 19, 1957

<b>COPPER:</b>	Electrolytic, Delivered F.o.b. cars, Valley basis	\$29.25
	Lake, Delivered, destination, U.S.A.	\$29.25
	Foreign Copper, Valley basis	\$29.25
	Custom	\$28.50
<b>LEAD:</b>	Common Grade, New York	\$14.00
	Tri State Concentrates, 80% lead, per ton	\$170.52
<b>ZINC:</b>	Prime Western, F.o.b. E. St. Louis	\$10.00
	Prime Western, Delivered, New York	\$10.50
	Tri-State Concentrates, 60% zinc, per ton	\$60.00
<b>ALUMINUM:</b>	Primary 30 Pound Ingots (99% pure), F.o.b. shipping points	\$27.10
<b>ANTIMONY:</b>	Lone Star Brand, F.o.b. Laredo, in bulk	\$33.50
<b>BISMUTH:</b>	(In ton lots) price per pound	\$2.25
<b>CADMIUM:</b>	Sticks and bars, 1 to 5 ton lots (Price per pound)	\$1.70
<b>COBALT:</b>	97.99%, keg of 550 pounds (Price per pound)	\$2.00
<b>COLUMBIUM:</b>	Powder	\$120.00
<b>GERMANIUM:</b>	Germanium dioxide, high purity, gram	\$11.00-\$14.00
<b>LITHIUM:</b>	98% (per pound)	\$24.00-\$30.00
	Carbonate	\$2.00
<b>MAGNESIUM:</b>	Ingots (99.8%) F.o.b. Valasco, Texas, per pound	\$36.00
<b>MERCURY:</b>	Flasks, Small lots, New York	\$255.00-\$257.00
<b>NICKEL:</b>	"F" Ingots (5 pounds), F.o.b. refinery, Port Colbourne, Ontario	\$75.50
<b>PLUTONIUM:</b>	To July 1, 1962 AEC will pay \$30.00 to \$40.00 per gram depending on plutonium 240 content. July 1, 1962 to June 30, 1963, per gram	\$30.00
	99.5%, per pound	\$10.50
<b>SELENIUM:</b>	Grade A Brands, New York (Price per pound) Prompt delivery	\$43.00
<b>THORIUM:</b>	99.3% + Grade "A" Sponge (Price per pound)	\$96.00
<b>TIN:</b>	Nominal, per kilogram	\$2.25
<b>TITANIUM:</b>	Nominal, per pound	\$40.00
<b>URANIUM:</b>	United States Treasury Price	\$7.25
<b>U-235:</b>	Newly mined domestic, United States Treasury price	\$35.00 per ounce
<b>GOLD:</b>	Foreign Handy Harmon	\$90.25
<b>SILVER:</b>	Per Ounce	\$92.00-\$95.00
<b>PLATINUM:</b>	Sponge, Per Pound, Nominal	\$10.00
<b>ZIRCONIUM:</b>		

## ORES AND CONCENTRATES

<b>BERYLLIUM ORE:</b>	10 to 12% BeO, F.o.b. mine, Colorado	\$46.00 per unit
	Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H.	
	Visual inspection at \$400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, \$40 per unit; 9.0 to 9.9%, \$45; over 10.0%, \$50.	
<b>CHROME ORE:</b>	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian), 48% Cr <sub>2</sub> O <sub>3</sub> , 3 to 1 Ratio	\$56.00-\$57.00
	African (Transvaal), 48% Cr <sub>2</sub> O <sub>3</sub> , No Ratio	\$40.00-\$41.00
	Turkish, 48% Cr <sub>2</sub> O <sub>3</sub> , 3 to 1 chrome-iron ratio	\$60.00
	U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, \$115.00; fines and concentrates \$110.00 for 48% Cr <sub>2</sub> O <sub>3</sub> and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr <sub>2</sub> O <sub>3</sub> .	
<b>COLUMBIUM-TANTALUM ORE:</b>	At United States small lot beryl purchase depots, \$3.40 per pound contained combined pentoxides in 50% ore. Includes 100% bonus. (Government stopped buying temporarily May 12)	
	Per Pound Pentoxide	\$1.15-1.35
<b>IRON ORE:</b>	Lake Superior, Per gross ton Lower Lake Ports	
	Mesabi, Non Bessemer, 51.5% Fe.	\$11.45
	Mesabi, Bessemer, 51.5% Fe.	\$11.60
	Old Range Non Bessemer.	\$11.70
	Old Range Bessemer.	\$11.85
	Swedish, Atlantic Port, 60 to 64% Fe Contracts, Per Unit	\$28.00
<b>MANGANESE ORE:</b>	Metallurgical grade, 48 to 50% Mn, Long ton unit	\$1.45-\$1.50
	Metallurgical grade, 46 to 48% Mn, Long ton unit	\$1.40-\$1.45
	Metallurgical grade, 44 to 46% Mn, Long ton unit	\$1.35-\$1.40
	Domestic U. S. Government ore purchasing depots: Butte, Montana; (black and pink ores) base price of \$4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana; base price of \$6.43 per long ton of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) \$2.30 plus premium and penalties.	
<b>MOLYBDENUM CONCENTRATE:</b>	90% MoS <sub>3</sub> , F.o.b. Climax, Colorado, Per pounds of contained molybdenum, plus cost of containers	\$1.18
<b>TUNGSTEN CONCENTRATE:</b>	Domestic, 60% WO <sub>3</sub> Per short ton unit Government not buying	\$55.00
	Foreign, 65% WO <sub>3</sub> Per short ton unit (Scheelite)	\$14.00
<b>URANIUM ORE:</b>	Foreign, South American, Spanish, Portuguese	\$13.00-\$13.50
	Carnotite-Roscoelite, F.o.b. purchase depot plus \$0.06 per ton mile (\$6.00 maximum) Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado, Salt Lake City, Marysville, Moab, Green River and Monticello, Utah, Shiprock, and Grants, New Mexico, Edgemont, S. Dakota, Riverton, Wyoming, Tuba City, Arizona. Base price for 0.10% ore is \$1.50 per pound and up to \$3.50 per pound of contained U <sub>3</sub> O <sub>8</sub> plus \$0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of \$0.25 per pound for each in excess of 10 pounds. A \$0.50 per pound development allowance paid on all ore purchases. Special lime schedule applies at Monticello, Moab and Grants. No lime penalty with no vanadium payment or lime penalty with vanadium payment.	
<b>VANADIUM ORE:</b>	Carnotite-Roscoelite, V <sub>2</sub> O <sub>5</sub> in ratio at more than 10 parts to 1 part of U <sub>3</sub> O <sub>8</sub> are generally acceptable at all AEC depots, but excess not paid for at Marysville, Monticello, and Bluewater. Shiprock has no limit on V <sub>2</sub> O <sub>5</sub> to U <sub>3</sub> O <sub>8</sub> ratio and all contained V <sub>2</sub> O <sub>5</sub> is paid for	Per Pound V <sub>2</sub> O <sub>5</sub> \$0.31

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	Metallurgical grade, 70% effective CaF <sub>2</sub> content per short ton F.o.b.	
	Illinois-Kentucky mines	\$40.00
	Mexican, 70% F.o.b. border	\$24.00-\$24.50
	Acid Grade, 97% CaF <sub>2</sub> , Bulk, F.o.b. Kentucky, Illinois, Colorado	\$50.00
	Government buying F.o.b. producer's shipping point: 60% Illinois-Kentucky, \$34.50 per ton, others \$28.50; 70% Ill.-Ken. \$38.50, others \$32.50.	
<b>PERLITE:</b>	Crude, F.o.b. mine per short ton	\$3.00 to \$5.00
	Plaster grades, Crushed and sized, F.o.b. plants	\$7.00 to \$9.00
<b>SULPHUR:</b>	Long ton, F.o.b. Hoskins Mound, Texas	\$25.50
	Export	\$30.50

## LONDON METAL AND MINERAL PRICES

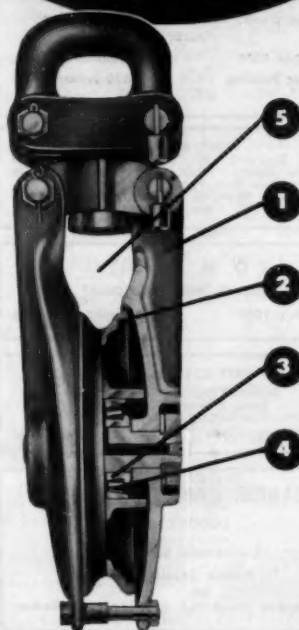
July 19, 1957

	Per Long Ton USA Equivalent cents per pound	
<b>COPPER:</b>	Electrolytic spot	\$216
<b>LEAD:</b>	Refined 99%	10s 0d 27.06¢
<b>ZINC:</b>	Refined 99%	8 89 0s 0d 11.12¢
<b>ALUMINUM:</b>	Ingots, 99.5%	£ 75 0s 0d 9.41¢
<b>ANTIMONY:</b>	Ingots, 99.5%	\$197 0s 0d 24.62¢
<b>TIN:</b>	Regulus, 99.6%	10s 0d 27.81¢
<b>TUNGSTEN:</b>	Standard, 99.75%	0s 0d 93.38¢
	Long ton unit	1055 \$14.70

With Sterling pound at \$2.80.

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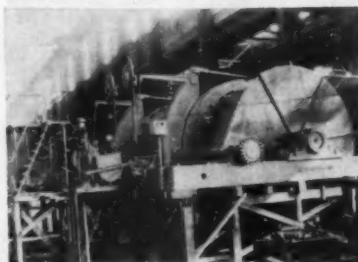
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## Bringing up core ... with drill rods in the hole

**Longyear Wire Line equipment allows more drilling time per shift... improves core recovery!**

Another core sample heading for the box and the crew about to go for more *without pulling up the drill string*. That's drilling with Longyear Wire Line equipment!

Drillers using the Longyear Wire Line Core Barrel lower an "overshot" through the drill string to bring up the Inner Tube containing core. Here's what this can mean to your operation:

- 1 The drill string normally remains in the hole except when it is necessary to replace the bit. This eliminates much of the hard labor of drilling and allows more actual drilling time per shift.
- 2 Caving, the major cause of blocking and bit damage, is minimized. There is little chance for caving while the drill string is in the hole—which is most of the time.

3 Longyear Wire Line Core Barrels are equipped with the water shut-off valve. In closed circuit drilling (possible with Longyear transmission pumps), the shut-off valve gives an immediate, positive indication of a block in the core barrel, eliminating costly "hunches" on the part of the drill runner.

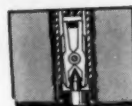
Wire Line experience includes hundreds of thousands of feet drilled in many kinds of formations. Reports consistently show lower costs per foot of core recovered. In one overseas operation, switching from conventional NX equipment to BX Wire Line increased footage from ten to forty-seven feet per shift. In most cases when drilling in ground that is difficult to core, Wire Line improves core recovery substantially.

Looking ahead to your next drilling project, keep in mind that Longyear offers a complete line of Core Barrels and expert technical assistance in the selection of the right equipment for the formation you want to drill.

At end of core run, overshot assembly is lowered by wire through drill string.



At bottom drill string, overshot latches on to spear of inner tube.



Core-bearing inner tube reaches the surface, is freed from overshot.



Core is removed. Meanwhile, stand-by inner tube is dropped into the hole so drilling can be resumed as soon as it is in position.



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